Contractors' and Engineers' Monthly

JOHN CRERAR
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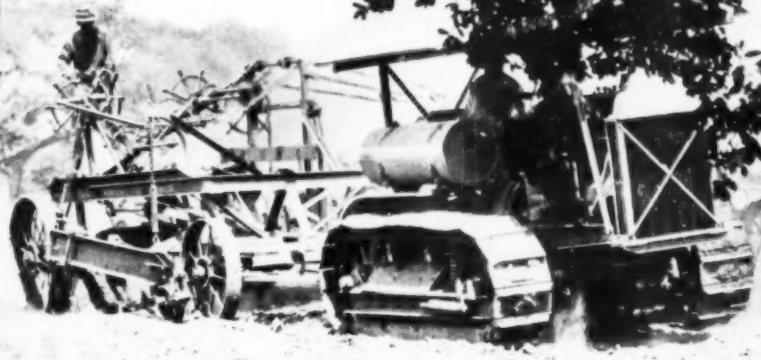
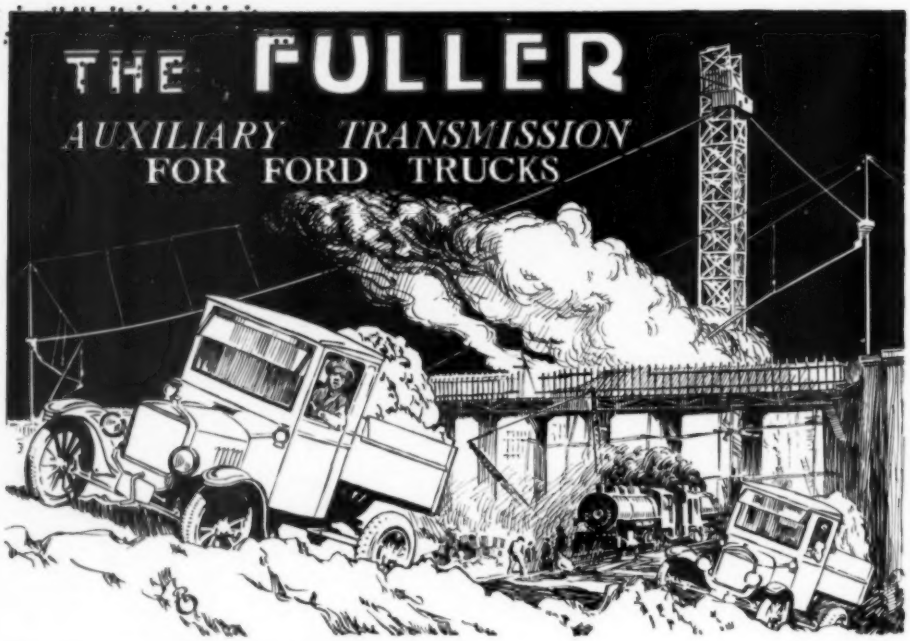


Tractor and Road Machine
at Extensive Grading Job

JANUARY, 1927
25 Cents $1 a Year



A PRACTICAL TRANSMISSION AT A SENSIBLE PRICE

FULLER FEATURES

Four Speeds Forward—Two Reverse
No Neutral Position (Ford Brakes Always Available)
No Added Strain on Motor, Universal Joint, or Drive Shaft
No Rebuilding Necessary; No Cutting of Drive Shaft
Installation, 2 to 3 Hours; No Special Tools Needed
Very Simple and Easy to Operate
Built by Fuller, Largest Manufacturers of Truck and Bus Transmissions in the World
Fully Guaranteed for 90 Days Against All Defects

The FULLER gives the Ford Truck all the extra speed, carrying capacity, and flexibility needed under the most rigorous hauling conditions.

It provides four speeds forward and two reverse. That's an ample range to meet every road condition. It gives the truck 80% more pulling ability, enough to haul two-ton loads up the steepest slopes.

Its reserve driving power permits the use of high-speed worm gear for heavy hauling. When loaded the truck can cover good roads at 30 miles an hour.

The FULLER fits the Ford Truck to meet every working condition, and its cost is well proportioned to the original low cost of the Ford Truck. It's a practical Auxiliary Transmission at a sensible price.

$5.00 Additional West of the Rockies

PRICE $60.00 F. O. B. FACTORY

FULLER & SONS MFG., CO.

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TRANSMISSION BUILDERS FOR 24 YEARS

VOL. XIV. No. 1 CONTRACTORS' & ENGINEERS' MONTHLY January, 1927
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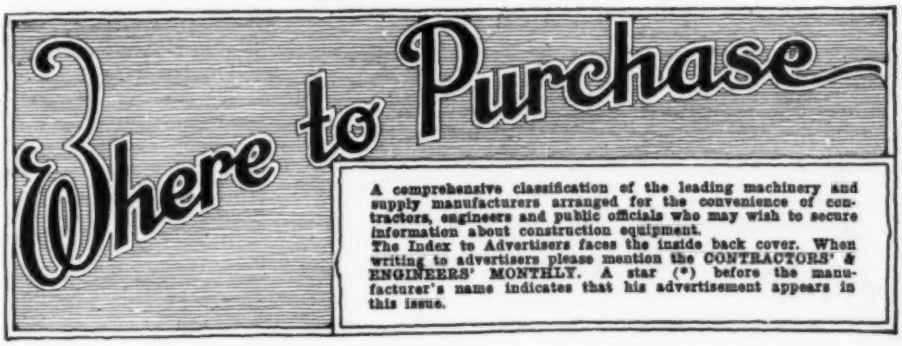

A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment.
The Index to Advertisers faces the inside back cover. When writing to advertisers please mention the CONTRACTORS' & ENGINEERS' MONTHLY. A star (*) before the manufacturer's name indicates that his advertisement appears in this issue.

This index is published as an aid to the reader, but the publishers assume no responsibility for errors or omissions.

AERIAL WIRE ROPE TRAMWAYS
*Amer. Steel & Wire Co., Chicago
Broderick & Bascom Rope Co., St. Louis
A. Leschen & Sons Rope Co., St. Louis

AIR COMPRESSORS
*American Steam Pump Co., Battle Creek, Mich.
*Barnes Mfg. Co., Mansfield, O.
*Buhl Co., Chicago.
*Curtis Pn. Mchy. Co., St. Louis, Mo.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Ingersoll-Rand Co., N. Y.
*Nevo Engine Co., Lansing, Mich.
*O. K. Clutch & Mach. Co., Columbia, Pa.
*Sullivan Mchy. Co., Chicago
Allis-Chalmers Mfg. Co., Milwaukee.
Chicago Pneumatic Tool Co., N. Y.
De Laval Stm. Turb. Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago.
Gardner Governor Co., Quincy, Ill.
General Elec. Co., Schenectady, N. Y.
Hardie-Tynes Mfg. Co., Bmingham, Ala.
Independent Pneum. Tool Co., Chicago
Nordberg Mfg. Co., Milwaukee.
Norwalk Ir. Wks. Co., So Norwalk, Ct.
Schramm, Inc., West Chester, Pa.
Stover Mfg. & Eng. Co., Freeport, Ill.
United Iron Wks., Kans. City, Mo.
Westinghouse Trac. Brake Co., Wilmerding, Pa.
Worthington Pump & Mchy. Corp., N. Y.

ARC LAMPS
General Elec. Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

ARTESIAN WELL DRILLS & PUMPS
*Ingersoll-Rand Co., New York
Am. Well Works, Aurora, Ill.

ASBESTOS PRODUCTS
*Philip Carey Co., Cincinnati.
Keasbey & Mattison Co., Ambler, Pa.
Mikesell Bros. Co., Wabash, Ind.
Norristown Mag. & Asb. Co., Norristown, Pa.
Sall Mountain Co., Chicago.

ASH HANDLING MACHINERY
*Bay City Dredge Wks., Bay City, Mich.
*Byers Mach. Co., Ravenna, O.
*Chain Belt Co., Milwaukee
*Chicago Automatic Conv. Co., Chicago
*Geo. Haiss Mfg. Co., N. Y.
*Mack Trucks, Inc., N. Y.
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Lakewood Eng. Co., Cleveland, O.
*Link-Belt Co., Chicago
*Orton Crane & Shovel Co., Chicago
Atla-Corp., New York
C. O. Barlett & Snow Co., Cleveland, O.
Brown Hoisting Mach. Co., Cleveland, O.
Gifford-Wood Co., Hudson, N. Y.
Green Eng. Co., E. Chicago, Ind.
Jeffrey Mfg. Co., Columbus, O.
Portable Mach. Co., Passaic, N. J.
Robins Conv. Belt Co., N. Y.
Jas. B. Seaverns Co., Chicago
Webster Mfg. Co., Chicago.
Weller Mfg. Co., Chicago.

ASPHALT
*Barber Asphalt Co., Philadelphia.
*Barrett Co., N. Y.
*Standard Oil Co. (Ind.), Chicago.
*Standard Oil Co. (N. Y.), N. Y.
*Warren Bros. Co., Boston.
Atlantic Ref. & Asph. Corp., Phila.
Gulf Refining Co., Pittsburgh
Ky. Rock Asph. Co., Louisville, Ky.
New Orleans Ref. Co., New Orleans.
Pioneer Asph. Co., Lawrenceville, Ill.
Sinclair Ref. Co., Chicago.
Standard Oil Co. of Cal., S. Francisco.
Standard Oil Co. of La., N. Orleans.
Standard Oil Co. of N. J., Newark.
Texas Co., N. Y.

ASPHALT BLOCK
Hastings Pavement Co., N. Y.

ASPHALT CUTTERS
*Ingersoll-Rand Co., N. Y.
*Littleford Bros., Cincinnati
*Sullivan Machinery Co., Chicago.
Chicago Pneumatic Tool Co., N. Y.
Cleveland Rock Drill Co., Cleveland, O.
Dayton Pneum. Tool Co., Dayton, O.
Independent Pn. Tool Co., Aurora, Ill.

ASPHALT KETTLES (See Kettles for Asphalt and Tar Heating)

ASPHALT PLANTS, TOOLS, ETC.
*Aeroil Burner Co., Union Hill, N. J.
*Barber Asphalt Co., Philadelphia.
*Chausse Oil Burner Co., Elkhart, Ind.
*Littleford Bros., Cincinnati, O.
*Warren Bros. Co., Boston.
F. D. Cummer & Son Co., Cleveland, O.
J. D. Farasey Co., Cleveland, O.
Hetherington & Berner, Indianapolis.
Mosher Mfg. Co., Chicago, Ill.

ASPHALT ROLLERS (See Road Rollers)

ASPHALT SURFACE HEATERS
*Aeroil Burner Co., Union Hill, N. J.
*Barber Asphalt Co., Philadelphia.
*Chausse Oil Burner Co., Goshen, Ind.
*Equitable Asp. Maint. Co., Kan. C., Mo.
*Hauck Mfg. Co., B'klyn, N. Y.

BACKFILLERS
*Baker Mfg. Co., Springfield, Ill.
*Bay City Dredge Wks., Bay City, Mich.
*Buckeye Trac. Ditcher Co., Findlay, O.
*Byers Machine Co., Ravenna, O.
*Harnischfeger Corp., Milwaukee, Wis.
*Koehring Co., Milwaukee, Wis.
*Miami Trailer-Scraper Co., Troy, O.
*Orton Crane & Shovel Co., Chicago
*Speeder Mchy. Corp., Fairfield, Ia.
*Waterman Corp., Detroit
Austin Mach. Corp., Muskegon, Mich.
Construction Mchy. Co., Waterloo, Ia.
Ersted Mchy. Mfg. Co., Portland, Ore.
Lessman Loader Mfg. Co., Des Moines
Parsons Co., Newton, Ia.
Weller Mfg. Co., Chicago.

BAR BENDERS AND CUTTERS
*Koehring Co., Milwaukee, Wis.
*Ransome Conc. Mchy. Co., Dunellen, N.J
Buffalo Forge Co., Buffalo, N. Y.
Concrete Steel Co., N. Y.
Electric Welding Co., Pittsburgh.
D. A. Hinman & Co., Sandwich, Ill.
J. L. Gleason & Co., Boston, Mass.
McKenna Co., Cleveland, O.

BAR CHAIRS, REINFORCING
*Truscon Steel Co., Youngstown, O.
Concrete Steel Co., N. Y.
Universal Form Clamp Co., Chicago

BAR TIES
*Bates Valve Bag Co., Chicago.

BATCH BOXES
*Easton Car & Const'n Co., Easton, Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.
*Lakewood Eng. Co., Cleveland, O.
*Littleford Bros., Cincinnati
Easton Car & Const'n Co. of Mo., Kansas City, Mo.
Jas. B. Seaverns Co., Chicago
Western Wheeled Scraper Co., Aurora, Ill.

BEARINGS
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bear. Co., Harrison, N. J.
New Departure Mfg. Co., Bristol, Conn.
S. K. F. Industries, New York
Timken Roller Bearing Co., Canton, O.

BINS, STORAGE
*Atlas Eng. Co., Milwaukee, Wis.
*Austin-Western Rd. Mach. Co., Chicago.
*Blaw-Knox Co., Pittsburgh, Pa.
*Easton Car & Const'n Co., Easton, Pa.
*Erie Steel Const. Co., Erie, Pa.
*Galion Iron Wks. & Mfg. Co., Galion, O.
*Good Roads Mchy. Co., Kennett Sq., Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.

If you find any errors or omissions in this Where to Purchase list, please send corrections to
CONTRACTORS' & ENGINEERS' MONTHLY

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Where to Purchase

*Link-Belt Co., Chicago
*Ransome Conc. Mchy. Co., Dunellen, N.J.
*Russell Grader Mfg. Co., Minneapolis.
*Universal Rd. Mach. Co., Kingston, N. Y.
Austin Mfg. Co., Chicago.
Birmingham Tank Co., Bmingham, Ala.
Brown Hoisting Mchy. Co., Cleveland.
Fairfield Eng. Co., Marion, O.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Jas. B. Seaverns Co., Chicago
Weller Mfg. Co., Chicago.

BLAST HOLE DRILLING MACHINES (See "Well Drilling and Blast Hole Machines")

BLASTING POWDER (See Explosives)

BLOCKS AND TACKLE
*Boston & Lockport Blk. Co., E. Boston, Mass.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*Western Block Co., Lockport, N. Y.
Upson-Walton Co., Cleveland, O.

BLUE PRINT MACHINES
Paragon Mach. Co., Rochester, N. Y.
C. F. Pease Co., Chicago.
Wickes Bros., Saginaw, Mich.

BOILERS
*S. Flory Mfg. Co., Bangor, Pa.
*Johnston Bros., Inc., Ferrysburg, Mich.
Chandler & Taylor Co., Indianapolis.
Chatta. Boiler & Tank Co., Chatta., Tenn.
R. D. Cole Mfg. Co., Newnan, Ga.
Erie City Iron Wks., Erie, Pa.
Hartley Blr. Wks., Montgomery, Ala.
Heine Boiler Co., St. Louis, Mo.
E. Keeler Co., Williamsport, Pa.
Ladd Water Tube Blr. Co., P'tsbrgh, Pa.
V. Loffel & Co., Springfield, O.
Lord & Burnham Co., Irvington, N.Y.
Murray Iron Wks. Co., Burlington, Ia.
Nagle Eng. & Blr. Wks., Erie, Pa.
New Bern Iron Wks. & Sup. Co., New Bern, N. C.
Petroleum Iron Wks. Co., Sharon, Pa.
J. S. Schofield's Sons Co., Macon, Ga.
Stanwood Corp., Cincinnati, O.
Superior Body Corp., Marion, Ind.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Valk & Murdock Co., Charleston, S. C.
Vogt Mchy. Co., Inc., Louisville, Ky.
Walsh & Weidner Blr. Co., Chattanooga, Tenn.

BRACES, TRENCH
Jas. H. Channon Mfg. Co., Chicago.
Duff Mfg. Co., Pittsburgh, Pa.
Kalamazoo Fdry. & Mach. Co., Kalamazoo, Mich.
Waldo Bros. & Bond Co., Boston.

BRANDING TOOLS
*Everhot Mfg. Co., Maywood, Ill.

BRASS GOODS
*Union Water Meter Co., Worcester, Mass.
Glauber Brass Mfg. Co., Cleveland, O.
Haydenville Co., Haydenville, Mass.
Hays Mfg. Co., Erie, Pa.
Mueller Company, Decatur, Ill.
United Brass Mfg. Co., Cleveland, O.

BREAKERS, CONCRETE
*Buckeye Trac. Ditcher Co., Findlay, O.
*Ingersoll-Rand Co., N. Y.
Chicago Pneumatic Tool Co., N. Y.
Cleveland Rock Drill Co., Cleveland, O.
Hardsocg Wonder Drill Co., Ottumwa, Ia.

BRICK, PAVING (See Paving Brick)

BRIDGES AND BUILDINGS, STEEL
*Blaw-Knox Co., Pittsburgh, Pa.
*Russell Grader Mfg. Co., Minneapolis.
*Frederick Snare Corporation, N. Y.
Amer. Bridge Co., N. Y.
Bellefontaine Br. & Stl. Co., Bellefontaine, O.
Belmont Iron Wks., Phila.
Berlin Constr. Co., Berlin, Conn.
Bethlehem Steel Co., Bethlehem, Pa.
Boston Bridge Wks., Boston.
Central States Br. Co., Ind'polis, Ind.
Champion Bridge Co., Wilmington, O.
Chesapeake Ir. Wks., Baltimore, Md.
Chicago Br. & I. Wks., Chicago.
Clinton Bridge Wks., Clinton, Ia.
Eastern Bridge & Struc. Co., Worcester, Mass.
Flour City Orn. Iron Co., Minneapolis.
Fort Pitt Br. Wks., Pittsburgh, Pa.
Ingalls Ir. Wks. Co., Birmingham, Ala.
Inter. Stl. & Ir. Co., Evansville, Ind.
Louisville Br. & Ir. Co., Louisville, Ky.
McClintic Marshall Co., Pittsburgh, Pa.
Milwaukee Br. Co., Milwaukee, Wis.
Minn. Stl. & Mchy. Co., Minneapolis.
Missouri Vy. Br. & Ir. Co., Leavenworth, Kan.
Morava Constr. Co., Chicago.
Mt. Vernon Br. Co., Mt. Vernon, O.
Penn. Bridge Co., Beaver Falls, Pa.
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Richmond Struc. Stl. Co., Richmond, Va.
Riverside Br. Co., Martins Ferry, O.
Virginia Br. & Ir. Co., Roanoke, Va.
Wisc. Br. & Ir. Co., No. Milwaukee, Wis.

BRONZE TABLETS
Flour City Orn. Ir. Co., Minneapolis.
Imperial Brass Mfg. Co., Chicago.
J. L. Mott Iron Wks., N. Y.

BROOMS (See Street Sweeping Brooms)

BUCKETS, AUTOMATIC DUMPING
*Lakewood Eng. Co., Cleveland, O.
*Union Iron Wks., Inc., Hoboken, N. J.
G. L. Steubner Ir. Wks., Inc., Long Island City, N. Y.

BUCKETS, CLAM SHELL
*Blaw-Knox Co., Pittsburgh, Pa.
*Erie Steel Const'n Co., Erie, Pa.
*Geo. Haiss Mfg. Co., N. Y.
*J. P. Kiesler Co., Chicago.
*Lakewood Eng. Co., Cleveland, O.
*Link-Belt Co., Chicago
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Orton Crane & Shovel Co., Chicago
Brown Hoisting Mach. Co., Cleveland, O.
Browning Crane Co., Cleveland, O.
F. A. Coleman Co., Cleveland, O.
Hayward Co., N. Y.
Industrial Wks., Bay City, Mich.
McMyler Interstate Co., Cleveland, O.
Owen Bucket Co., Cleveland, O.
G. H. Williams Co., Erie, Pa.

BUCKETS, CONCRETE
*Insley Mfg. Co., Indianapolis, Ind.
*Koppel Ind. Car & Equip. Co., Koppel, Pa.
*Lakewood Eng. Co., Cleveland, O.
*Ransome Conc. Mchy. Co., Dunellen, N. J.
*Union Iron Works, Inc., Hoboken, N. J.
G. L. Steubner Ir. Wks., Inc., Long Island City, N. Y.

BUCKETS, DRAGLINE
*Dobbie Fdry. & Mchy. Co., Niagara Falls, N. Y.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Russel Grader Mfg. Co., Minneapolis.
*Sauerman Bros., Chicago.
Am. Mfg. & Eng. Co., Kalamazoo, Mich.
Page Eng. Co., Chicago.
Pioneer Bucket Co., Indianapolis, Ind.
Schofield-Burkett Const'n Co., Macon, Ga.

BUCKETS, DREDGING AND EXCAVATING
*Blaw-Knox Co., Pittsburgh, Pa.
*Geo. Haiss Mfg. Co., N. Y.
*J. P. Kiesler Co., Chicago.
*Lakewood Eng. Co., Cleveland, O.
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Orton Crane & Shovel Co., Chicago
Brown Hoisting Mach. Co. Cleveland, O.
Browning Crane Co., Cleveland, O.
Hayward Co., N. Y.
Owen Bucket Co., Cleveland, O.
G. H. Williams Co., Erie, Pa.

BUCKETS, ORANGE PEEL
*J. P. Kiesler Co., Chicago.
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Orton Crane & Shovel Co., Chicago
Hayward Co., N. Y.
Industrial Wks., Bay City, Mich.
McMyler Interstate Co., Cleveland, O.

BUILDINGS, STEEL (See Bridges)

BUNKS AND COTS
Ft. Pitt Bedding Co., Pittsburgh, Pa.
Haggard & Marcusson Co., Chicago.
Southern Rome Co., Baltimore, Md.

CABLES (See Wire and Cables)

CABLEWAY, DRAGLINE
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Russell Grader Mfg. Co., Minneapolis
*Sauerman Bros., Chicago
*Street Bros. Mach. Wks., Chattanooga
Schofield-Burkett Const'n Co., Macon, Ga.

CABS FOR MOTOR TRUCKS
Highland Body Mfg. Co., Cincinnati, O.
Weatherproof Body Corp., Corunna, Mich.

CAISSONS
American Bridge Co., N. Y.
Birmingham Tank Co., Bmingham, Ala.
Foundation Co., N. Y.
Bethlehem Steel Co., Bethlehem, Pa.
O'Rourke Eng. Constr. Co., N. Y.
Petroleum Ir. Wks. Co., Sharon, Pa.

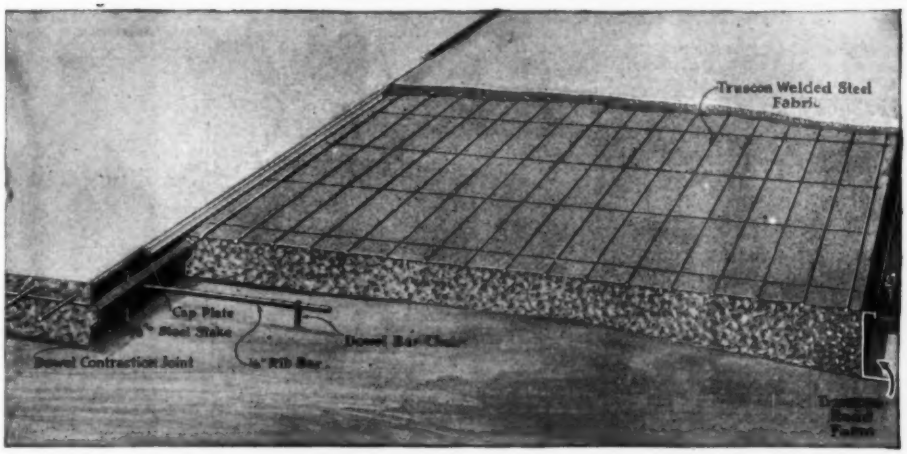
CALCIUM CHLORIDE FOR ROADS
*Dow Chemical Co., Midland, Mich.
*Solvay Sales Corp., New York
Carbondale Calcium Co., Carbondale, Pa.

CANS FOR GARBAGE AND REFUSE
American Can Co., N. Y.
Butler Mfg. Co., Minneapolis.
Economy Baler Co., Ann Arbor, Mich
Rochester Can Co., Rochester, N. Y.
Solar-Sturges Mfg. Co., Chicago.
Steel Basket Co., Cedar Rapids, Ia.

CAR UNLOADERS (See "Loaders")

CARS, INDUSTRIAL V. DUMPING
*Easton Car & Const. Co., Easton, Pa.
*Insley Mfg. Co., Indianapolis, Ind.
*Koppel Ind. Car & Equip. Co., Koppel, Pa.
*Lakewood Eng. Co., Cleveland, O.
Atlas Car & Mfg. Co., Cleveland, O.
Austin Mach. Corp., Muskegon, Mich.
Chase Fdry. & Mfg. Co., Columbus, O.
G. L. Steubner Ir. Wks., Inc., Long Island City, N. Y.
C. W. Hunt Co., W. New Brighton, N. Y.
United Ir. Wks., Inc., Kans. City, Mo.
Weller Mfg. Co., Chicago.
Whiting Corp., Harvey, Ill.

CARTS, CONCRETE
*Akron Barrow Co., Cleveland, O.
*Easton Car & Const. Co., Easton, Pa.
*Insley Mfg. Co., Indianapolis, Ind.
*Jackson Mfg. Co., Harrisburg, Pa.
*Lakewood Eng. Co., Cleveland, O.
*Lansing Co., Lansing, Mich.
*Littleford Bros., Cincinnati, O.
*Ransome Conc. Mchy. Co., Dunellen, N.J.
*T. L. Smith Co., Milwaukee.
*Sterling Wheelbarrow Co., Milwaukee
*Toledo Wheelbarrow Co., Toledo, O.
Chattanooga Wheelbarrow Co., Chattanooga, Tenn.
Cleveland Wheelbarrow Co., Cleveland, O.
E. D. Etnyre & Co., Oregon, Ill.
Gray Iron Fdry. Co., Reading, Pa.
Lee Trailer & Body Co., Chicago.



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Truscon Products for reinforcing concrete roads and pavements add materially to their life and cut down maintenance.

WELDED STEEL FABRIC: for Permanency
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"Modern Road Construction and Field Book
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TRUSCON

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO

WAREHOUSES AND OFFICES IN ALL PRINCIPAL CITIES

EXHIBIT
January 10th to the 14th inclusive at Chicago, Road Show of the American Road Builders Association.

Where to Purchase

CAST IRON PIPE (See Pipe, Cast Iron)

CASTINGS, STREET AND SEWER
*Burch Plow Wks. Co., Crestline, O.
*Central Fdry. Co., N. Y.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*U. S. Cast Ir. Pipe & Fdry. Co., Burlington, N. J.
Canton Fdry. & Mach. Co., Canton, O.
Casey-Hedges Co., Chattanooga, Tenn.
J. B. Clow & Sons, Chicago.
W. E. Dee Co., Chicago.
Elkhart Fdry. & Mach. Co., Elkhart, Ind.
Gilbert Mfg. Co., Aberdeen, S. Dak.
Klauer Mfg. Co., Dubuque, Ia.
Madison Fdry. Co., Cleveland, O.
Pechstein Iron Works, Keokuk, Ia.
Sessions Foundry Co., Bristol, Conn.
South Bend Fdry. Co., So. Bend, Ind.

CATCH BASINS (See Castings, Street)

CATCH BASIN CLEANING OUTFITS
*Mack Trucks, Inc., N. Y.
Atia Corp., New York
Elgin Sales Corp., N. Y.
Movakan Co., Indianapolis, Ind.

CAULKING MACHINERY AND TOOLS
*Ingersoll-Rand Co., N. Y.
Cleveland Rock Drill Co., Cleveland, O.
Helwig Mfg. Co., St. Paul, Minn.
Mueller Company, Decatur, Ill.

CEILINGS, METAL
Berger Mfg. Co., Canton, O.
Canton Art Metal Co., Canton, O.
Globe Iron Roofing & Cor. Co., Cincinnati, O.
Newport Rolling Mill Co., Newport, Ky.
Klauer Mfg. Co., Dubuque, Ia.
Geo. L. Mesker & Co., Evansville, Ind.
Milwaukee Corr. Co., Milwaukee.
Wheeling Corr. Co., Wheeling, W. Va.

CEMENT (*P. C. stands for Portland Cement*)
*Pennsylvania-Dixie Cement Corp., N. Y.
Acme Cement Corp., Catskill, N. Y.
Ætna P. C. Co., Detroit, Mich.
Alabama P. C. Co., Birmingham, Ala.
Allentown P. C. Co., Catasauqua, Pa.
Alpha P. C. Co., Easton, Pa.
Ash Grove Lime and P. C. Co., Kansas City, Mo.
Atlas P. C. Co., N. Y.
Beaver P. C. Co., Portland, Ore.
Bessemer Limestone & C. Co., Youngstown, O.
British Col. Cement Co., Victoria, B. C.
Canada Cement Co., Ltd., Montreal, Canada.
Colorado P. C. Co., Denver, Colo.
Consolidated Cement Corp., Chicago
Cowell P. C. Co., Cowell, Cal.
Crescent P. C. Co., Wampum, Pa.
Dewey P. C. Co., Kansas City, Mo.
Diamond P. C. Co., Cleveland, O.
Edison P. C. Co., N. Y.
Georgia Cement & Stone Co., Birmingham, Ala.
Giant P. C. Co., Philadelphia, Pa.
Glens Falls P.C. Co., Glens Falls, N.Y.
Golden State P.C. Co., Los Angeles, Cal.
Great West'n P. C. Co., Kans. C., Mo.
Hawkeye P. C. Co., Des Moines, Ia.
Hercules Cement Corp., Philadelphia.
Hermitage P. C. Co., Nashville, Tenn.
Huron P. C. Co., Detroit, Mich.
Indiana P. C. Co., Indianapolis, Ind.
International Cement Corp., N. Y.
International P. C. Co., Ltd., Spokane, Wash.
Kansas P. C. Co., Kansas City, Mo.
Knickerbocker P. C. Co., Inc., Albany, N. Y.
Kosmos P. C. Co., Louisville, Ky.
La Tolteca Compania de Cemento Portland, Mexico City, Mex.
Lawrence P. C. Co., New York
Lehigh P. C. Co., Allentown, Pa.
Louisville Cement Co., Louisville, Ky.
Manitowoc P. C. Co., Manitowoc, Wis.
Marlboro Cement Co., Edmonton, Can.
Marquette Cement Mfg. Co., Chicago.
Missouri P. C. Co., St. Louis, Mo.
Monarch Cement Co., Humboldt, Kans.
Monolith P. C. Co., Los Angeles, Cal.
National Cement Co., Birmingham, Ala.
Nazareth Cement Co., Nazareth, Pa.
Nebraska Cement Co., Denver, Colo.
Newago P. C. Co., Newago, Mich.
New Egyptian P. C. Co., Detroit.
North Amer. Cement Corp., Albany, N. Y.
Northwestern States P. C. Co., Mason City, Ia.
Oklahoma P. C. Co., Denver.
Olympic P. C. Co., Ltd., Seattle.
Oregon P. C. Co., Portland, Ore.
Pacific P. C. Co., San Francisco.
Peerless P. C. Co., Detroit, Mich.
Peninsular P. C. Co., Cement City, Mich.
Penn-Allen Cement Co., Allentown, Pa.
Petoskey P. C. Co., Petoskey, Mich.
Phoenix P. C. Co., Philadelphia
Pgh. Plate Glass Co., Zanesville, O.
P. C. Co. of Utah, Salt Lake City.
Pyramid P. C. Co., Des Moines
Riverside P. C. Co., Los Angeles.
St. Marys Cement Co., Toronto, Can.
San Antonio P. C. Co., San Antonio.
Sandusky Cement Co., Cleveland, O.
Santa Cruz P. C. Co., San Francisco.
Signal Mountain P. C. Co., Chatta., Tenn.
Southern States P. C. Co., Rockport, Ga.
Southwest'n P. C. Co., Los Angeles, Cal.
Standard P. C. Co., Cleveland
Sun P. C. Co., Portland, Ore.
Superior P. C. Co., Seattle, Wash.
Texas P. C. Co., Dallas, Tex.
Three Forks P. C. Co., Denver, Colo.
Tidewater P. C. Co., Baltimore, Md.
Trinity P. C. Co., Dallas, Tex.
Union P. C. Co., Denver, Col.
U. S. P. C. Co., Denver, Colo.
Universal P. C. Co., Chicago
Utah Idaho Cement Co., Ogden, Utah
Virginia P. C. Corp., Norfolk
Vulcanite P. C. Co., Philadelphia
Wabash P. C. Co., Detroit
Warrior Cement Corp., Chatta., Tenn.
Wellston Iron Furnace Co., Jackson, O.
Wolverine P. C. Co., Coldwater, Mich.
Wyandotte P. C. Co., Detroit

CEMENT BLOCK MACHINES
*Cement Block Mach. Co., Newark, N. J

CEMENT GUNS
*Cement Gun Co., Allentown, Pa.

CEMENT INSPECTION (See Inspecting Laboratories)

CEMENT TOOLS
Abrams Cement Tool Co., Detroit

CENTRIFUGAL PUMPS (See "Pumps, Centrifugal")

CHAINS
*Chain Belt Co., Milwaukee, Wis.
*Link-Belt Co., Chicago
Amer. Chain Co., Inc., Bridgeport, Conn.
Columbus McKinnon Chain Co., Columbus, O.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., Columbus, O.
U. S. Chain & Forge Co., Pittsburgh, Pa.
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

CHIMNEYS, CONCRETE
Heine Chimney Co., Chicago
Rust Engineering Co., Pittsburgh, Pa.
Weber Chimney Co., Chicago

CHIMNEYS, RADIAL BRICK
Amer. Chimney Corp., N. Y.
Alphons Custodis Chimney Const. Co. N.Y.
Continental Chimney Co. of Chi., Chicago
Heine Chimney Co., Chicago
H. R. Heinicke, Inc., Indianapolis, Ind.
M. W. Kellogg & Co., N. Y.
Rust Eng. Co., Pittsburgh, Pa.

CHIMNEYS, STEEL (See Stacks, Steel)

CHLORINATORS
*Wallace & Tiernan Co., Inc., Newark, N. J.

CHLORINE, LIQUID
(See Liquid Chlorine)

CHUTES, CONCRETE
*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Eng. Co., Cleveland, O.
*Ransome Conc. Mchy. Co., Dunellen, N.J.

CLAY PIPE
(See "Pipe, Vitrified Clay")

CLIPS, WIRE ROPE
Amer. Hoist & Derrick Co., St. Paul, Minn.
Fischer & Hayes Rope & Steel Co., Chicago
Thos. Laughlin Co., Portland, Me.
Marion Malleable Ir. Wks., Marion, Ind.
C. M. Meckbee & Co., Cincinnati, O.
John A. Roebling Sons Co., Trenton, N.J.
Upson-Walton Co., Cleveland, O.

CLUTCHES
*Twin Disc Clutch Co., Racine, Wis.
*Waukesha Motor Co., Waukesha, Wis.

COAL AND ORE CONVEYING MCHY.
*Barber-Greene Co., Aurora, Ill.
*Chain Belt Co., Milwaukee, Wis.
*Chicago Automatic Conv. Co., Chicago
*Good Roads Machy. Co., Kennett Sq., Pa.
*Geo. Haiss Mfg. Co., N. Y.
*Link-Belt Co., Chicago
*Mead-Morrison Mfg. Co., E. Boston, Mass.
C. O. Bartlett & Snow Co., Cleveland, O.
Brown Hoisting Mchy. Co., Cleveland, O.
Fairfield Eng. Co., Marion, O.
Gifford-Wood Co., Hudson N. Y.
C. W. Hunt Co., Inc., W. New Brighton, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., N. Y.
Portable Machinery Co., Passaic, N. J.
Robins Conv. Belt Co., N. Y.
Jas. B. Seaverns Co., Chicago
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago.

COCKS, CURB AND CORPORATION
*Union Wtr. Mtr. Co., Worcester, Mass.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Glauber Brass Mfg. Co., Cleveland, O.
Haydenville Co., Haydenville, Mass.
Hays Mfg. Co., Erie, Pa.
Mueller Co., Decatur, Ill.

COLLAPSIBLE HORSES
Taylor Collapsible Horse Co., Chicago

COLUMN CLAMPS
*Insley Mfg. Co., Indianapolis, Ind.
*M. & M. Wire Clamp Co., Minneapolis
*Sterling Wheelbarrow Co., Milwaukee
The O. D. G. Co., Owensboro, Ky.
Victor L. Phillips Co., Kansas City, Mo.
Symons Clamp & Mfg. Co., Chicago.
Universal Form Clamp Co., Chicago

COMPRESSORS, AIR (See Air Compressors)

CONCRETE BLOCK MACHINES (See Cement Block Machines)

CONCRETE FLOOR HARDENER
Anti-Hydro Waterproofing Co., Newark N. J.

If you find any errors or omissions in this Where to Purchase list, please send corrections to
CONTRACTORS' & ENGINEERS' MONTHLY

"DID NOT think a gas shovel could be made, to dig as well as steam." BUT NOW HE WRITES—

"More than pleased with Gas+Air ERIE"—

Read this owner's report:

"I stayed away from the gas shovel because I did not think one could be made that would dig as well as a steam machine.

"Last spring we had a job in the country on which a gas shovel was almost a necessity, and decided to try the Gas+Air ERIE and we have been more than pleased. Last month we moved 15,000 yards with this shovel and had only two trucks hauling. The material was extremely hard, but the Gas+Air ERIE dug it with ease.

"We will always be glad to speak a good word for the Gas+Air ERIE."—*B. W. Stone, Pres., Wilburn & Stone, Inc., Seattle, Wash.*

Other owners of Gas+Air ERIES, everywhere, are just as well pleased—

Let us send you some addresses of owners nearest you. Go and see these remarkable shovels, *that have given the contractor an entirely different idea of a gas shovel's output possibilities.*

Watch this gasoline shovel work with all the speed and flexibility of a steam machine. The "crowd" and "swing" are driven by direct-connected air engines that are always in gear.

Owners tell us that, for digging ability and larger output, it has *no competition* in the gas shovel field.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.

Branch Offices: Boston, New York, Philadelphia, Atlanta, Chicago

GAS+AIR and Steam ERIE DREADNAUGHT

SHOVELS, CRANES, DRAGLINES, TRENCH HOES, ETC.

Where to Purchase

General Chemical Co., N. Y.
General Firepr. Co., Youngstown, O.
Granitex Corp., N. Y.
A. C. Horn Co., L. I. City, N. Y.
Master Builders Co., Cleveland, O.
L. Sonneborn Sons, Inc., N. Y.
Truscon Laboratories, Detroit.

CONCRETE HEATERS
*Aeroil Burner Co., Union Hill, N. J.
*Chausse Oil Burner Co., Elkhart, Ind.
*Hauck Mfg. Co., Brooklyn, N. Y.
*Littleford Bros., Cincinnati
*Alex. Milburn Co., Baltimore, Md.

CONCRETE MIXERS
*Amer. Cem. Mchy. Co., Inc., Keokuk, Ia.
*Atlas Eng. Co., Milwaukee, Wis.
*Chain Belt Co., Milwaukee
*Jaeger Mach. Co., Columbus, O.
*Kiel Mach. Co., Kiel, Wis.
*Koehring Co., Milwaukee, Wis.
*Lakewood Eng. Co., Cleveland, O.
*Lansing Co., Lansing, Mich.
*Ransome Con. Mchy. Co., Dunellen, N.J.
*T. L. Smith Co., Milwaukee, Wis.
*Standard Scale & Supply Co., Pittsburgh
Badger Con. Mixer Co, Milwaukee
Construction Mchy. Co., Waterloo, Ia.
B. M. Cropp Co., Chicago.
The Foote Co., Nunda, N. Y.
J. B. Foote Fdry. Co., Fredericktown, O.
Gray Iron Fdry Co., Reading, Pa.
Judy Mfg. Co., Centerville, Ia.
Knickerbocker Co., Jackson, Mich.
Kwik-Mix Con. Mixer Co., Port Washington, Wis.
Leach Co., Oshkosh, Wis.
Marsh-Capron Co., Chicago.
Milwaukee Conc. Mixer Co., Milwaukee.
Raber & Lang Mfg. Co., Kendallville, Ind.
Rammel Mfg. Co., Kewaskum, Wis.
Republic Ir. Wks. Tecumseh, Mich.
Schramm, Inc., West Chester, Pa.

CONCRETE PILING (See Piling)

CONCRETE PIPE (See Pipe, Concrete)

CONCRETE REINFORCEMENT
*American Steel & Wire Co. Chicago
*Truscon Steel Co., Youngstown, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Concrete Steel Co., N. Y.
Consolidated Exp. Metal Co., Wheeling, W. Va.
Electric Welding Co., Pittsburgh, Pa.
Ft. Pitt Bridge Wks, Pittsburgh, Pa.
General Fireproofing Co., Youngstown, O.
Inland Steel Co., Chicago.
Kalman Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
National Steel Fabric Co., Pittsburgh.
J. T. Ryerson & Son, Chicago.
Wickwire-Spencer Steel Co., N. Y.
Youngstown Pressed Steel Co., Warren, O.
Youngstown Sheet & Tube Co., Youngstown, O.

CONCRETE ROAD FINISHERS
*Heltzel Stl. Form & Iron Co., Warren, O.
*Lakewood Eng. Co., Cleveland, O.
Dunn Road Mach. Co., Conneaut, O.
A. W. French & Co., Chicago

CONCRETE SURFACING MACHINES
*Concrete Surfacing Machy. Corp., Cincinnati, O.

CONCRETE TOOLS
*The Dallett Co., Philadelphia.

CONDENSERS
*Ingersoll-Rand Co., N. Y.
Allis-Chalmers Mfg. Co., Milwaukee.
Dean Bros. Co., Indianapolis, Ind.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
Wheeler Cond. & Eng. Co., Carteret, N.J.
Worthington Pump & Machy Corp., N.Y.

CONDUIT RODS
F. Bissell Co., Toledo, O.
Turbine Sewer Mch. Co., Milwaukee.
Waldo Bros. & Bond Co., Boston.

CONDUITS, UNDERGROUND
Amer. Vitr. Products Co., Akron, O.
Johns-Manville Inc., N. Y.
National Fireproofing Co., N. Y.
Ric-wiL Co., Cleveland.

CONTRACTORS' EQUIPMENT DEALERS (See pages 151 to 181)

CONVEYORS, BELT
*Austin-Western Rd. Mchy. Co., Chicago
*Barber-Greene Co., Aurora, Ill.
*Chain-Belt Co., Chicago
*Chicago Automatic Conv. Co., Chicago
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Good Rds. Mchy. Co., Kennett Sq., Pa.
*Geo. Haiss Mfg. Co., N. Y.
*Jos. Honhorst Co., Cincinnati
*Link-Belt Co., Chicago
*Northern Conveyor Co., Janesville, Wis.
*Jas. Seaverns Co., Chicago
*Russell Grader Mfg. Co., Minneapolis.
Brown Hoisting Machy. Co., Cleveland
Gifford Wood Co., Hudson, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Samuel Olson & Co., Chicago.
Portable Machy Co., Passaic, N. J.
Robins Conv. Belt Co., N. Y.
Standard Conv. Co., No. St. Paul, Minn.
Webster Mfg. Co., Chicago.
Weller Mfg. Co., Chicago.

CONVEYORS, BUCKET
*Atlas Eng. Co., Milwaukee.
*Chain Belt Co., Milwaukee
*Chicago Automatic Conv. Co., Chicago
*Good Rds. Machy. Co., Kennett Sq., Pa.
*Geo. Haiss Mfg. Co., N. Y.
*Jos. Honhorst Co., Cincinnati, O.
*Link-Belt Co., Chicago
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Russell Grader Mfg. Co., Minneapolis.
C. O. Bartlet & Snow Co., Cleveland, O.
Brown Hoisting Machy. Co., Cleveland, O.
H. W. Caldwell & Son, Chicago.
Fairfield Eng. Co., Marion, O.
Gifford Wood Co., Hudson, N. Y.
Godfrey Conv. Co., Elkhart, Ind.
Guarantee Constn. Co., N. Y.
Jeffrey Mfg. Co., Columbus, O.
Samuel Olson & Co., Chicago.
Jas. B. Seaverns Co., Chicago
Republic Rubber Co., Youngstown, O.
Robins Conv. Belt Co., N. Y.
Stephens Adamson Mfg. Co., Aurora, Ill.
Webster Mfg. Co., Chicago.
Weller Mfg. Co., Chicago.

CONVEYORS, GRAVITY
Lamson Co., Syracuse, N. Y.
Logan Co., Louisville, Ky.
Mathews Conveyor Co., Elwood City, Pa.
Standard Conv. Co., No. St. Paul, Minn.

COUPLINGS, HOSE
*Ingersoll-Rand Co., N. Y.
Cleveland Pneum. Tool Co., Cleveland, O.
Gilman Mfg. Co., East Boston, Mass.
W. H. Keller, Inc., Grand Haven, Mich.

CRANES, LOCOMOTIVE
*Bay City Dredge Wks., Bay City, Mich.
*Erie Steam Shovel Co., Erie, Pa.
*Harnischfeger Corp., Milwaukee.
*Koehring Co., Milwaukee.
*Link-Belt Co., Chicago
*Moore Speedcrane Co., Chicago
*Orton Crane & Shovel Co., Chicago
*Thew Shovel Co., Lorain, O.
Amer. Hst. & Derrick Co., St. Paul, Minn.
Brown Hoisting Machy Co., Cleveland.
Browning Crane Co., Cleveland, O.
Bucyrus Co., So. Milwaukee, Wis.
Davenport Loc. Wks., Davenport, Ia.
Hanna Eng. Works, Chicago.
Industrial Wks., Bay City, Mich.
Loc. Crane Co. of Amer., Champaign, Ill.
Marion Steam Shovel Co., Marion, O.
McMyler Interstate Co., Cleveland, O.
Northwest Eng. Works, Chicago.
Ohio Loc. Crane Co., Bucyrus, O.
Jas. B. Seaverns Co. Chicago
U. S. Crane Co., Chicago.

CRANES, OVERHEAD TRAVELING
*Curtis Pneum. Mach. Co., St. Louis
*Harnischfeger Corp., Milwaukee.
Alliance Mach. Co., Alliance, O.
Chesapeake Iron Wks., Baltimore, Md.
Chisholm-Moore Mfg. Co., Cleveland, O.
Milwaukee Elec. Crane Co., Milwaukee.
Morgan Eng. Co., Alliance, O.
Northern Eng. Wks., Detroit, Mich.
Shaw Crane Wks., Muskegon, Mich.
Shepard Elec. Cr. & Hst. Co., Montour Falls, N. Y.
Toledo Crane Co., Bucyrus, O.
Whiting Fdry. & Equip. Co., Harvey, Ill.

CRANES, TRUCK
*Byers Machine Co., Ravenna, O.
*Harnischfeger Corp., Milwaukee.
*Orton Crane & Shovel Co., Chicago
Atia Corp., New York
Bay City Fdry. & Mach. Co., Bay City, Mich.
Browning Crane Co., Cleveland
Universal Crane Co., Cleveland.

CRANES, WRECKING
Bucyrus Co., So. Milwaukee, Wis.
Industrial Wks., Bay City, Mich.

CRAWLER ATTACHMENTS
*Geo. Haiss Mfg. Co., New York

CREOSOTED BLOCKS, TIMBER, ETC.
Amer. Creos. Co., Inc., Louisville, Ky.
Amer. Creos. Wks., Inc., N. Orleans, La.
Carter Bloxonend Flooring Co., K. City, Mo.
Colonial Cre. Co., Inc., Louisville, Ky.
Compressed Wood Preserving Co., Cincinnati, O.
Creos. Materials Co., N. Orleans, La.
Georgia Creos. Co., Louisville, Ky.
Jennison-Wright Co., Toledo, O.
Midland Creos. Co., Granite City, Ill.
Pensacola Creosoting Co., Pensacola, Fla.
Republic Creos. Co., Indianapolis, Ind.
Southern Wood Pres. Co., Atlanta, Ga.
Wyckoff Pipe & Creos. Co., N. Y.

CREOSOTING AND CREOSOTING OILS
*Barrett Co., N. Y.
Amer. Creos. Wks., Inc., N. Orleans, La.
Amer. Tar Prod. Co., Pittsburgh, Pa.
Jennison-Wright Co., Toledo, O.
Southern Creos. Co., Ltd., Slidell, La.
Southern Pavg. Const. Co., Chattanooga.
Wyckoff Pipe & Creos. Co., N. Y.

CRUSHERS, HEAVY DUTY
Allis-Chalmers Mfg. Co., Milwaukee.
O. G. Buchanan Co., N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

CRUSHERS, ROCK
*Acme Rd. Machy. Co., Frankfort, N. Y.
*Austin-Western Rd. Mach. Co., Chicago
*Galion Iron Wks. & Mfg. Co., Galion, O.
*Good Rds. Machy. Co., Kennett Sq., Pa.
*Russell Grader Mfg. Co., Minneapolis.
*Smith Eng. Wks., Milwaukee.
*Universal Rd Machy Co., Kingston, N.Y.
New Holland Mach. Co., New Holland, Pa.
Sturtevant Mill Co., Boston.
Universal Crusher Co., Cedar Rapids, Ia.

CULVERTS, CAST IRON
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*U. S. C. I. Pipe & Fdry. Co., Burlington, N. J.
Amer. C. I. Pipe Co., Birmingham, Ala.
Gilbert Mfg. Co., Aberdeen, S. D.
R. D. Wood & Co., Philadelphia.

CULVERTS, CORRUGATED METAL
*Austin-Western Rd. Mach. Co., Chicago
*Galion Iron Wks. & Mfg. Co., Galion, O.
*Good Rds. Mach. Co., Kennett Sq., Pa.
*Newport Culvert Co., Newport, Ky.
Bark River Bridge & Culv. Co., Bark River, Mich.

Mr. Contractor—

Now is the time to consider your new equipment for 1927

Road building is at a stand-still. Construction jobs are closed down for the winter. Now is the time for you to consider your new equipment for the coming season.

Cranes, draglines, shovels, ditchers, skimmers and buckets play such an important part in your field, and your profits depend so much on them, that their purchase should not be made too hastily.

Investigate the various makes of handling equipment. Know the advantages of one over another. Then, when you secure a contract, you can buy, with assurance, the machine best suited for your purpose.

ORTON Cranes and Shovels have been serving contractors for nearly a quarter of a century. Many large contractors standardize on them because ORTONS have exclusive features found in no other handling or excavating equipment.

Like all other progressive manufacturers, we have made improvements in design and operating mechanism. Knowledge begotten of experience in exclusive crane and shovel building has helped us to produce a better and faster machine than we did twenty years ago.

Find out about the ORTON of today. Know what makes it superior. Catalogs and complete information will be sent on request.

To Road Show Visitors: Come to Space N. C. 19, and see the ORTON ¾-yard Crane and ½-yard Gas Shovel. You will find a man who will go over the machines carefully with you and give you full details.

ORTON CRANE & SHOVEL CO.
Formerly ORTON & STFINBRENNER CO.
608 S. Dearborn St. CHICAGO, ILL.

ORTON
CRANE & SHOVEL CO.

Where to Purchase

Boardman Co., Okla. City, Okla.
Burnham Mfg. Co., Woods Cross, Utah.
Calif. Corr. Culv. Co., W. Berkeley, Cal.
Canada Ingot Ir. Co., Ltd., Guelph, Ont.
Canton Culv. & Silo Co., Canton, O.
Coast Culv. & Flume Co., Portland, Ore.
Corr. Culv. Co., Moberly, Mo.
Dixie Culv. & Metal Co., Atlanta, Ga.
Dixie Culv. Mfg. Co., Little Rock, Ark.
Fla. Metal Prod. Co., Jacksonville, Fla.
Gilbert Mfg. Co., Aberdeen, S. D.
R. Hardesty Mfg. Co., Denver, Colo.
Highway Prod. & Mfg. Co., Elmira, N.Y.
Ind. Corr. Culv. Co., Mason City, Ia.
Iowa Pure Ir. Co., Des Moines, Ia.
Klauer Mfg. Co., Dubuque, Ia.
Lyle Culv. & Rd. Equip. Co., Minneapolis, Minn.
Md. Culv. & Metal Co., Baltimore.
N. E. Metal Culv. Co., Palmer, Mass.
Nebraska Culv. & Mfg. Co., Wahoo, Neb.
North East Metal Culv. Co. Nashua, N.H.
Northfield Ir. Co., Northfield, Minn.
Northw't'rn Sheet & Ir. Wks., Wahpeton, N. D.
Ohio Corr. Culv. Co., Middletown, O.
W. Q. O'Neall Co., Crawfordsville, Ind.
Road Supply & Metal Co., Topeka, Kan.
Sioux Falls Metal Culv. Co., Sioux Falls, S. D.
So. Metal Culv. Co., Salisbury, N. C.
Spokane Culv. & Tank Co., Spokane.
Tenn. Metal Culv. Co., Nashville.
U. S. Br. & Culv. Co., Bay City, Mich.
Va. Metal Mfg. Co., Roanoke, Va.
Western Metal Mfg. Co., Houston, Tex.
Wheeling Corr. Co., Wheeling, W. Va.
Wyatt Metal & Bir. Wks., Dallas, Tex.

CULVERT FORMS
Concrete Form Co., Inc., Syracuse, N.Y.
Northfield Iron Co., Northfield, Minn.

CURB BOXES
Casey-Hedges Co., Chattanooga, Tenn.
H. W. Clark Co., Mattoon, Ill.
J. B. Clow & Sons, Chicago.
Madison Fdry. Co., Cleveland, O.
Mueller Co., Decatur, Ill.

CURB, GUTTER AND BASE FORMS
(See "Forms, Concrete")

CURB GUARDS, STEEL
*W. S. Godwin Co., Baltimore.

CURB, STEEL PROTECTED
*Truscon Steel Co., Youngstown, O.
Concrete Steel Co., N. Y.

CURING OF CONCRETE
*Dow Chemical Co., Midland, Mich.
*Solvay Sales Corp., N. Y.

CUTTERS, PIPE, HAND
Armstrong Mfg. Co., Bridgeport, Ct.
Barnes Tool Co., New Haven, Ct.
Erie Tool Works, Erie, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Oswego Tool Co., Oswego, N. Y.
Reed Mfg. Co., Erie, Pa.
Walworth Mfg. Co., Boston.

CUTTERS, ROD AND WIRE
*Koehring Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carolus Mfg. Co., Sterling, Ill.
C. D. Edwards Mfg. Co., Albert Lea, Minn.
Helwig Mfg. Co., St. Paul, Minn.
Worthington Pump & Mchy Corp., N.Y.

CUTTING EDGES
*Russell Grader Mfg. Co., Minneapolis
*Shunk Mfg. Co., Bucyrus, O.
J. D. Adams & Co., Indianapolis, Ind.

CUTTING AND WELDING APPARATUS
*Alex. Milburn Co., Baltimore.
MacLeod Co., Cincinnati, O.

DERRICKS, GUY AND STIFF-LEG
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*S. Flory Mfg. Co., Bangor, Pa.
*Insley Mfg. Co., Indianapolis, Ind.
*Sasgen Derrick Co., Chicago.
*Street Bros. Mach. Wks., Chattanooga
*Universal Hstg. Machy Corp., Buffalo.
Amer. Hst. & Derrick Co., St. Paul, Minn.
Federal Br. & Struc. Co., Waukesha, Wis.
John T. Horton Co., N. Y.
Lakeside Bridge & Steel Co., N. Milwaukee, Wis.
Lidgerwood Mfg. Co., N. Y.
National Hstg. Eng. Co., Harrison, N.J.
Superior Iron Wks., Superior, Wis.

DERRICKS, PIPE LAYING
*Dobbie Fdry. & Mach. Co., Niagara Falls
*Street Bros. Mach. Wks., Chattanooga
Lidgerwood Mfg. Co., N. Y.
Mueller Co., Decatur, Ill.
Squier-Rix Co., Milwaukee.

DERRICKS, REVOLVING
*Clyde Iron Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls
*Street Bros. Mach. Wks., Chattanooga
Lidgerwood Mfg. Co., N. Y.

DERRICKS, STEEL
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls.
*Insley Mfg. Co., Indianapolis, Ind.
*Street Bros. Mach. Wks., Chattanooga
Amer. Hst. & Derrick Co., St. Paul
Hayward Co., N. Y.
Lidgerwood Mfg. Co., N. Y.
Taylor Port. St. Derrick Co., Chicago.

DERRICKS, STEEL PORTABLE
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls.
*Street Bros. Mach. Wks., Chattanooga
Amer. Hoist & Derrick Co., St. Paul
Atia Corp., New York
Lidgerwood Mfg. Co., N. Y.

DERRICKS, TRAVELING
*Bay City Dredge Wks., Bay City, Mich.
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls.
*Orton Crane & Shovel Co., Chicago
*Street Bros. Mach. Wks., Chattanooga
Amer. Hoist & Derrick Co., St. Paul
Austin Machy Corp., Muskegon, Mich.
Hayward Co., N. Y.
Nat'l Hstg. Eng. Co., Harrison, N. J.

DERRICK FITTINGS
*S. Flory Mfg. Co., Bangor, Pa.
*Street Bros. Mach. Wks., Chattanooga
Lidgerwood Mfg. Co., N. Y.

DIESEL ENGINES (See Engines, Oil)

DISTRIBUTORS, TAR AND ASPHALT
Kinney Mfg. Co., Boston

DISTRIBUTING PLANTS, CONCRETE
*Lakewood Eng. Co., Cleveland.
*Insley Mfg. Co., Indianapolis, Ind.
*Ransome Conc. Mchy. Co., Dunellen, N.J.
Archer Iron Works, Chicago.

DITCHING MACHINES (See Excavators)

DIVIDING PLATES (ROAD)
*W. S. Godwin Co., Baltimore

DOORS AND SHUTTERS, STEEL ROLLING
Cornell Iron Wks., B'klyn, N. Y.
Kinnear Mfg. Co., Columbus, O.
Variety Fire Door Co., Chicago.
J. G. Wilson Corp., N. Y.

DRAFTING MACHINES
Univ. Drafting Mach. Co., Cleveland, O.

DREDGES
*Bay City Dredge Wks., Bay City, Mich.
*Erie Steam Shovel Co., Erie, Pa.
*Orton Crane & Shovel Co., Chicago
*Street Bros. Mach. Wks., Chattanooga
Amer. Steel Dredge Co., Ft. Wayne, Ind.
Bucyrus Co., So. Milwaukee, Wis.
Ellicott Machy Corp., Baltimore.
Hayward Co., N. Y.
Lidgerwood Mfg. Co., N. Y.
Marion Steam Shovel Co., Marion, O.
Osgood Co., Marion O.
Stockton Iron Wks., Stockton, Cal.
Superior Iron Wks., Superior, Wis.

DREDGES, DIPPER
*Bay City Dredge Wks., Bay City, Mich.
Amer. Steel Dredge Co., Ft. Wayne, Ind.
Austin Machy Corp., Muskegon, Mich.
Bucyrus Co., So. Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Osgood Co., Marion, O.

DREDGES, HYDRAULIC
Bucyrus Co., South Milwaukee, Wis.
Ellicott Mach. Corp., Baltimore.
Marion Steam Shovel Co., Marion, O.
Morris Mach. Wks., Baldwinsville, N.Y.

DREDGING MACHINERY
*S. Flory Mfg. Co., Bangor, Pa.
*Street Bros. Mach. Wks., Chattanooga
Lidgerwood Mfg. Co., N. Y.

DREDGING PUMPS AND ACCESSORIES
*Ingersoll-Rand Co., New York
Erie Pump & Engine Wks., Medina, N.Y.

DRILLS, CORE
*Ingersoll-Rand Co., N. Y.
*McKiernan-Terry Drill Co., N. Y.
*Sullivan Machy. Co., Chicago.

DRILLS, ROCK
*Dallett Co., Philadelphia.
*Denver Rock Drill Mfg. Co., Denver.
*Ingersoll-Rand Co., N. Y.
*McKiernan-Terry Drill Co., N. Y.
*Sullivan Machy. Co., Chicago.
Chicago Pneum. Tool Co., N. Y.
Cleveland Pneum. Tool Co., Cleveland, O.
Cleveland Rock Drill Co., Cleveland, O.
Gilman Mfg. Co., E. Boston.
Hardsoog Wonder Drill Co., Ottumwa, Ia.
Helwig Mfg. Co., St. Paul, Minn.
Independent Pneum. Tool Co., Chicago.
W. H. Keller, Inc., Grand Haven, Mich.
Wood Drill Wks., Paterson, N. J.

DRILLS FOR WELLS AND BLAST HOLES (See Well Drilling Machy)

DRUMS, HOLDING
*Blaw-Knox Co., Pittsburgh, Pa.
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mch. Co., Niagara Falls.
*Street Bros. Mach. Wks., Chattanooga
Hayward Co., N. Y.
Monighan Machine Co., Chicago.

DRYERS, ASPHALT AND CEMENT
Allis-Chalmers Mfg. Co., Milwaukee.
Amer. Blower Co., Detroit, Mich.
Amer. Process Co., N. Y.
Atlas Dryer Co., Cleveland, O.
C. O. Bartlett & Snow Co., Cleveland, O.
F. D. Cummer & Son Co., Cleveland, O.
Mosher Mfg. Co., Chicago
Ruggles-Coles Eng. Co., N. Y.

DRYERS, SAND AND GRAVEL
*Aeroil Burner Co., Union Hill, N. J.
*Chausse Oil Burner Co., Elkhart, Ind.
*Jos. Honhorst Co., Cincinnati, O.
*Littleford Bros., Cincinnati, O.
*Alex. Milburn Co., Baltimore, Md.
C. O. Bartlett & Snow Co., Cleveland, O.
Chase & Lyman, Boston.
Mosher Mfg. Co., Chicago

DUMP BODIES FOR CONCRETE
*Easton Car & Const'n Co., Easton, Pa.
Lee Trailer & Body Co., Chicago

DUMP BODIES FOR MOTOR TRUCKS
*Anthony Co., Streator, Ill.
*Easton Car & Constn Co., Easton, Pa
*Heil Co., Milwaukee.
*Highway Trailer Co., Edgerton, Wis.
*Insley Mfg. Co., Indianapolis, Ind.
*Littleford Bros., Cincinnati, O.
*Mack Trucks, Inc., N. Y.
*Marion Steel Body Co., Marion, O.
*N. Y. Central Ir. Wks., Hagerstown, Md.

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RANSOME DOMESTIC REPRESENTATIVES

ALBANY, N. Y. Eagle-Spunk Supply Co. Inc.
ASHEVILLE, N. C. North State Culvert & Machinery Co.
AGUADILLA, P.R. Prescott Machinery Co.
ATLANTA, Ga. Henry E. Williams
BALTIMORE, Md. Glenn & Bannister
BIRMINGHAM, Ala. Smith-Meadow Supply Co. Inc.
BOSTON, Mass. The Clark Wilcox Co.
BROOKLYN, N. Y. John P. Fitzgerald
BUFFALO, N. Y. The Wheeler-Murray Co.
BUTTE, Montana Western Supply Co.
CANTON, Ohio J. C. Steele & Co.
CLARKSBURG, W. Va. Core-Saxe Supply & Equipment Co.
CHARLOTTE, N. C. C. Fred Casey Co.
CHATTANOOGA, Tenn. Ocoee Sales Company
CHICAGO, Ill. Ransome Concrete Machinery Co.
CLEVELAND, Ohio T. F. Frey Co.
COLUMBIA, S. C. Fred D. Marshall, Inc.
COLUMBUS, Ohio John M. Neilly
DALLAS, Texas W. Rathbone Co.
DAVENPORT, Iowa Allen B. Bradford
DENVER, Colo. Cowin & Hall Co.
DETROIT, Mich. W. H. Anderson Tool & Supply Co.
EL PASO, Texas Roe L. Johnson
HUNTINGTON, W. Va. Blake Mills Supply Co.
JACKSONVILLE, Fla. Stanley & Hill Machinery Co.
LOS ANGELES, Cal. Smith & Co.
MEMPHIS, Tenn. Pidgeon-Thomas Iron Co.
MINNEAPOLIS, Minn. Wm. P. Hale & Co.
MOBILE, Ala. Lagarde-Goodling Co. Inc.
MONTREAL, Canada Canadian Equipment Co.
NASHVILLE, Tenn. R. L. Packard
NEWARK, N. J. Johnson & Desmarais Inc.
NEW HAVEN, Conn. The Clark Wilcox Co.
NEW ORLEANS, La. Gin E. Conn.
NEW YORK, N. Y. Fitzgerald & Hudson
NORTHPORT, N. Y. F. G. MacDonald
PHILADELPHIA, Pa. Grier & Rannister
PITTSBURGH, Pa. Ransome Machinery Co.
PORTLAND, Ore. McMaster Supply Co.
RICHMOND, Va. Geo. Philips
ROCKFORD, Ill. Rowden Bros. Co.
SAN ANTONIO, Texas Brandt Iron Works
SAN FRANCISCO, Cal. Ransome & McClellan, Inc.
SEATTLE, Wash. Washington Machinery & Storage Co.
SPOKANE, Wash. General Machinery Co.
SPRING LAKE, Mich. W. H. Anderson Tool & Supply Co.
ST. LOUIS, Mo. Central Equipment Co.
SYRACUSE, N. Y. The Wheeler-Murray Co.
TAMPA, Fla. Tampa Machinery Co.
TOLEDO, Ohio National Supply Co.
TORONTO, Ontario Clare Osborn Ltd.
VANCOUVER, B. C. B. C. Equipment Co.

Where to Purchase

*Stewart Iron Wks. Co., Cincinnati.
*Wood Hydr. Hoist & Body Co., Detroit
Am. Truck & Body Co., Martinsville, Va.
Archer Iron Wks., Chicago.
Atia Corp., New York
Columbia Body Corp., Columbia, Pa.
Columbian St. Tank Co., Kansas City.
Detroit Trailer & Mach. Co., Detroit.
Ditwiler Mfg. Co., Galion, O.
Galion All Steel Body Co., Galion, O.
Griscom-Russell Co., N. Y.
Herr Dump Car Mfg Co., Coatesville, Pa.
Hughes-Keenan Co., Mansfield, O.
The Hug Co., Highland, Ill.
Jennings Aut. Dump Body, Roanoke, Va.
Lee Trailer & Body Co., Chicago.
Mandt Body Co., Keokuk, Ia.
Pechstein Iron Wks., Keokuk, Ia.
Superior Body Corp'n, Marion, Ind.
Van Dorn Iron Wks., Cleveland.

DUMP CARTS AND WAGONS, HORSE
*Acme Rd. Machy. Co., Frankfort, N. Y.
*Austin-Western Rd Machy. Co., Chicago.
*Eagle Wagon Wks., Auburn, N. Y.
*Highway Trailer Co., Edgerton, Wis.
*La Plant-Choate Mfg. Co., Cedar Rapids, Ia.
*Rex-Watson Corp., Canastota, N. Y.
*Russell Grader Mfg. Co., Minneapolis.
Acme Wagon Co., Emigsville, Pa.
Austin Mfg. Co., Chicago.
Bain Wagon Co., Kenosha, Wis.
Columbia Body Corp., Columbia, Pa.
Gilbert Mfg. Co., Aberdeen, S. D.
Hagy Wagon Co., Abingdon, Va.
C. H. Holsbog & Bro., Jeffersonville, Ind.
Little Red Wagon Co., Omaha, Neb.
Stockland Rd. Machy. Co., Minneapolis.
Streich Bros., Oshkosh, Wis.
Thornhill Wagon Co., Lynchburg, Va.
Western Wheeled Scraper Co., Aurora, Ill.

DUST LAYING (CALCIUM CHLORIDE)
*Dow Chemical Co., Midland, Mich.
*Solvay Sales Corp., N. Y.
Carbondale Calcium Co., Carbondale, Pa.

DYNAMITE (See Explosives)

EJECTORS, SEWAGE (See Sewage Ejectors)

ELECTRIC GENERATORS AND MOTORS
Louis Allis Co., Milwaukee.
Allis-Chalmers Mfg. Co., Milwaukee.
Crocker-Wheeler Co., Ampere, N. J.
Fairbanks, Morse & Co., Chicago
General Elec. Co., Schenectady, N. Y.
Graybar Electric Co., New York.
Ideal Elec. & Mfg. Co., Mansfield, O.
Lincoln Elec. Co., Cleveland, O.
Robbins & Myers Co., Springfield, O.
Triumph Elec. Co., Cincinnati, O.
Wagner Elec. Mfg. Co., St. Louis.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC LAMPS
General Elec. Co., Schenectady, N. Y.
Westinghouse Lamp Co., N. Y.

ELECTRIC LIGHTING PLANTS
*Climax Eng. Co., Clinton, Ia.
Allis-Chalmers Mfg. Co., Milwaukee.
Cushman Motor Wks., Lincoln, Neb.
Fairbanks, Morse & Co., Chicago
General Elec. Co., Schenectady, N. Y.
Graybar Electric Co., New York.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC TRANSFORMERS
Allis-Chalmers Mfg. Co., Milwaukee.
General Elec. Co., Schenectady, N. Y.
Kuhlman Elec. Co., Bay City, Mich.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

ELECTRIC WIRES (See Wire)

ELEVATORS, BUCKET
*Atlas Eng. Co., Milwaukee.
*Austin-Western Rd. Machy. Co., Chicago.
*Chain Belt Co., Milwaukee, Wis.
*Good Rds. Machy. Co., Kennett Sq., Pa.
*Geo. Haiss Mfg. Co., N. Y.
*Link-Belt Co., Chicago
*Littleford Bros., Cincinnati.
*Russell Grader Mfg. Co., Minneapolis.
*Spears-Wells Machy. Co., Oakland, Cal.
*Univ. Rd. Machy. Co., Kingston, N. Y.
Austin Mfg. Co., Chicago.
C. O. Bartlett & Snow Co., Cleveland, O.
Brown Hstg. Machy. Co., Cleveland, O.
Fairfield Eng. Co., Marion, Ohio
Gifford-Wood Co., Hudson, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Robins Conv. Belt Co., N. Y.
Webster Mfg. Co., Chicago.
Weller Mfg. Co., Chicago.
Worthington Pump & Mchy. Corp., N.Y.

ELEVATORS, PASSENGER, FREIGHT, ETC.
Am. Elev. & Mach. Co., Louisville, Ky.
Atlantic Elev. Co., Inc., Philadelphia.
Bay State Elev. Co., Springfield, Mass.
Haughton Elev. & Mach. Co., Toledo, O.
Kaestner & Hecht Co., Chicago.
Llewellyn Ir. Wks., Los Angeles, Cal.
Montgomery Elev. Co., Moline, Ill.
Otis Elevator Co., N. Y.
C. Ridgway & Son Co., Coatesville, Pa.
A. B. See Elec. Elev. Co., N. Y.
Speidel Elev. Corp., Reading, Pa.
Warner Elev. Mfg. Co., Cincinnati.
Warsaw Elev. Co., Warsaw, N. Y.

ENGINES, GAS AND GASOLINE
*Alamo Eng. Co., Hillsdale, Mich.
*Beaver Mfg. Co., Milwaukee, Wis.
*Caterpillar Tr'tor Co., San Leandro, Cal.
*Climax Eng. Co., Clinton, Ia.
*Continental Motors Corp., Muskegon, Mich.
*Cook Motor Co., Delaware, O.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Hercules Motors Corp., Canton, O.
*Ingersoll-Rand Co., New York
*John Lauson Mfg. Co., New Holstein, Wis.
*Le Roi Co., Milwaukee.
*Novo Engine Co., Lansing, Mich.
*Servel Mfg. Co., Evansville, Ind.
*Waukesha Motor Co., Waukesha, Wis.
Allis-Chalmers Mfg. Co., Milwaukee
Buda Co., Harvey, Ill.
C. H. & E. Mfg. Co., Milwaukee
Charter Gas Eng. Co., Sterling, Ill.
Chicago Pneum. Tool Co., N. Y.
Cushman Motor Wks., Lincoln, Neb.
Evinrude Motor Co., Milwaukee.
Fairbanks, Morse & Co., Chicago.
Foos Gas Eng. Co., Springfield, O.
Fuller & Johnson Mfg. Co., Madison, Wis.
Hinkley Motors, Inc., Detroit
Minneapolis Steel & Machy. Co., Minneapolis, Minn.
Sanderson-Cyclone Drill Co., Orrville, O.
Sterling Eng. Co., Buffalo, N. Y.
Stover Mfg. & Eng. Co., Freeport, Ill.
Universal Motor Co., Oshkosh, Wis.
Weber Engine Co., Kansas City, Mo.
Wisconsin Motor Mfg. Co., Milwaukee.
Worthington Pump & Mchy. Corp., N.Y.

ENGINES, HOISTING (See Hoists)

ENGINES, KEROSENE
*Alamo Eng. Co., Hillsdale, Mich.
*Climax Eng. Co., Clinton, Ia.
*Waukesha Motor Co., Waukesha, Wis.
Stover Mfg. & Eng. Co., Freeport, Ill.

ENGINES, OIL
DIESEL
Allis-Chalmers Mfg. Co., Milwaukee
Busch-Sulzer Bros.-Diesel Eng. Co., St. Louis.
Fulton Iron Wks. Co., St. Louis.
McIntosh & Seymour Corp., Auburn, N.Y.
Nordberg Mfg. Co., Milwaukee.
St. Mary's Oil Eng Co., St. Charles, Mo.
Western Machy. Co., Los Angeles, Cal.

SEMI-DIESEL
*Ingersoll-Rand Co., N. Y.
Anderson Fdry. & Mach. Co., Anderson, Ind.
Bessemer Gas Eng. Co., Grove City, Pa.
Buckeye Machinery Co., Lima, O.
Charter Gas Eng. Co., Sterling, Ill.
Chicago Pneum. Tool Co., N. Y.
De La Vergne Mach. Co., N. Y.
Fairbanks, Morse & Co., Chicago.
Foos Gas Eng. Co., Springfield, O.
Lombard Gov. Co., Ashland, Mass.
Muncie Oil Eng. Co., Muncie, Ind.
New London Ship & Eng. Co., Groton, Ct.
Nordberg Mfg. Co., Milwaukee.
Stover Mfg. & Eng. Co., Freeport, Ill.
Taylor Mach. Co., Cleveland, O.
Weber Eng. Co., Kansas City, Mo.
Worthington Pump & Mchy. Corp., N.Y.

ENGINES, PUMPING
*Climax Eng. Co., Clinton, Ia.
*Waukesha Motor Co., Waukesha, Wis.
Allis-Chalmers Mfg. Co., Milwaukee.
Hooven, Owens, Rentschler Co., Hamilton, O.
Murray Iron Wks., Burlington, Ia.
Nordberg Mfg. Co., Milwaukee.
Stover Mfg. & Eng. Co., Freeport, Ill.
Worthington Pump & Mchy. Corp., N.Y.

ENGINES, SWINGING
*Dake Eng. Co., Grand Haven, Mich.
Lidgerwood Mfg. Co., N. Y.

EXCAVATING MACHINERY (See Names Under Exc'tors, also Steam Shovels)

EXCAVATORS, CABLEWAY
*Street Bros. Mach. Co., Chattanooga
Amer. Mfg. & Eng. Co., Kalamazoo, Mich.
Bucyrus Co., So. Milwaukee, Wis.
Erated Machy. Mfg. Co., Portland, Ore.
Lidgerwood Mfg. Co., N. Y.

EXCAVATORS, DITCH AND TRENCH
*Barber-Greene Co., Aurora, Ill.
*Bay City Dredge Wks., Bay City, Mich.
*Buckeye Trac. Ditcher Co., Findlay, O.
*Byers Mach. Co., Ravenna, O.
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Erie Steam Shovel Co., Erie, Pa.
*Harnischfeger Corp., Milwaukee.
*Insley Mfg. Co., Indianapolis, Ind.
*Keystone Driller Co., Beaver Falls, Pa.
*Lidgerwood Mfg. Co., N. Y.
*Moore Speedcrane Co., Chicago
*Orton Crane & Shovel Co., Chicago
*Russell Grader Mfg. Co., Minneapolis.
*Speeder Machy. Corp., Fairfield, Ia.
*Street Bros. Mach. Co., Chattanooga
*Thew Shovel Co., Lorain, O.
American Hst. & Derrick Co., St. Paul.
Austin Mach. Corpn., Muskegon, Mich.
Brown Hstg. Machy. Co., Cleveland.
Bucyrus Co., So. Milwaukee, Wis.
Cleveland Trencher Co., Euclid, O.
Economy Exc. Co., Iowa Falls, Ia.
Erated Machy. Mfg. Co., Portland, Ore.
Hayward Co., N. Y.
Marion Steam Shovel Co., Marion, O.
Monighan Mach. Co., Chicago.
Osgood Co., Marion, O.
Owensboro Ditcher & Grader Co., Owensboro, Ky.
Parsons Co., Newton, Ia.
C. T. Topping Machy. Co., Dayton, O.

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BALTIMORE, Bayard and Warner Sts. PHILADELPHIA, Colonial Trust Bldg. LONDON, ENG., Caxton House

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Where to Purchase

EXCAVATORS, DRAG-LINE
*Bay City Dredge Wks., Bay City, Mich.
*Byers Mach. Co., Ravenna, O.
*Clyde Ir. Wks Sales Co., Duluth, Minn.
*Erie Steam Shovel Co., Erie, Pa.
*Galion Ir. Wks & Mfg. Co., Galion, O.
*Harnischfeger Corp., Milwaukee, Wis.
*Link-Belt Co., Chicago
*Moore Speedcrane Co., Chicago
*Orton Crane & Shovel Co., Chicago
*Russell Grader Mfg. Co., Minneapolis.
*Sauerman Bros., Chicago.
*T. L. Smith Co., Milwaukee, Wis.
*Speeder Machy. Corp., Fairfield, Ia.
*Street Bros. Mach. Co., Chattanooga
*Thew Shovel Co., Lorain, O.
Austin Machy. Corp., Muskegon, Mich.
Brown Hstg. Machy. Co., Cleveland, O.
Browning Crane Co., Cleveland, O.
Bucyrus Co., So. Milwaukee, Wis.
Economy Exc. Co., Iowa Falls, Ia.
Ersted Machy. Mfg. Co., Portland, Ore.
C. L. Gade Exc. Wks., Iowa Falls, Ia.
Hayward Co., N. Y.
Industrial Wks., Bay City, Mich.
Lidgerwood Mfg. Co., N. Y.
Marion Steam Shovel Co., Marion, O.
Monighan Mach. Co., Chicago.
Osgood Co., Marion, O.
Schofield-Burkett Const'n Co., Macon, Ga.

EXPANDED METAL
*Truscon Steel Co., Youngstown, O.
Consolidated Exp. Metal Co., Wheeling, W. Va.
Northwestern Exp. Metal Co., Chicago.
Youngstown Pressed St. Co., Warren, O.

EXPANSION JOINT MATERIAL
*Barber Asphalt Co., Philadelphia.
*Barrett Co., N. Y.
*Philip Carey Co., Cincinnati, O.
*W. R. Meadows, Inc., Elgin, Ill.
*Truscon Steel Co., Youngstown, O.
Hoosier Asph. Co., Alexandria, Ind.
Pioneer Asph. Co., Lawrenceville, Ill.
Servicised Products Corp., Chicago
Texas Co., N. Y.
Waring-Underwood Co., Philadelphia.

EXPLOSIVES
Hercules Powder Co., Wilmington, Del.
Atlas Powder Co., Wilmington, Del.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Giant Powder Co., S. Francisco, Cal.
Grasselli Powder Co., Cleveland, O.

FENCING
*American Steel & Wire Co., Chicago
*Stewart Ir. Wks. Co., Cincinnati, O.
Adrian Wire Fence Co., Adrian, Mich.
Amer. Fence & Const. Co., New York
Anchor Post Iron Works, N. Y.
Cyclone Fence Co., Waukegan, Ill.
Dwiggins Wire Fence Co., Anderson, Ind.
Frost-Superior Fence Co., Warren, O.
Ill. Wire & Mfg. Co., Joliet, Ill.
Ind. Steel & Wire Co., Muncie, Ind.
Interlocking Fence Co., Morton, Ill.
Keystone Stl. & Wire Co., Peoria, Ill.
Kokomo Stl. & Wire Co., Kokomo, Ind.
Nitselman Bros., Muncie, Ind.
Mich. Wire Fence Co., Adrian, Mich.
Page Stl. & Wire Prod. Corp., Bridgeport, Conn.
Pittsburgh Steel Co., Pittsburgh, Pa.
Tex. Cyclone Fence Co., Ft. Worth, Tex.
Wickwire-Spencer Steel Co., N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

FILING EQUIPMENT STEEL
Art Metal Constr. Co., Jamestown, N. Y.
Berger Mfg. Co., Canton, O.
Gen. Fireproofing Co., Youngstown, O.
Van Dorn Iron Wks., Cleveland, O.

FILTERS, OIL
S. F. Bowser & Co., Inc., Ft. Wayne, Ind.
Wayne Tank & Pump Co., Ft. Wayne, Ind.

FILTERS, WATER
Amer. Water Softener Co., Phila., Pa.
Graver Corporation, E. Chicago, Ind.
International Filter Co., Chicago.
Norwood Eng. Co., Florence, Mass.
Roberts Filter Co., Darby, Pa.
W. B. Scaife & Sons, Pittsburgh, Pa.

FIRE ALARM SYSTEMS
Gamewell Co., Newton Upper Falls, Mass.

FIRE ALARM SIRENS
*Union Water Meter Co., Worcester, Mass.
Erick Elec. Siren Co., St. Paul, Minn.
Federal Sign System, Chicago.
Hendrie & Bolthoff Mfg. & Sup. Co., Denver, Colo.
Sterling Siren Fire Alarm Co., Rochester, N. Y.

FIRE APPARATUS, MOTOR
*Mack Trucks, Inc., N. Y.
Ahrens-Fox Fire Eng. Co., Cincinnati, O.
American-La France Fire Eng. Co., Elmira, N. Y.
Boyer Fire App. Co., Logansport, Ind.
Brockway Motor Fire App. Co., Cortlandt, N. Y.
Foamite-Childs Corp., Utica, N. Y.
Halo Fire Pump Co., Conshohocken, Pa.
Northern Fire Apparatus Co., Minneapolis, Minn.
Peter Pirsch & Sons Co., Kenosha, Wis.
Prospect Fire Engine Co., Prospect, O.
Seagrave Co., Columbus, O.
Stutz Fire Eng. Co., Indianapolis, Ind.
Waterous Fire Eng. Wks., St. Paul, Minn.
White Co., Cleveland

FIRE EXTINGUISHERS, CHEMICAL
American-LaFrance Fire Eng. Co., Elmira, N. Y.
Buffalo Fire App. Corp., Buffalo, N.Y.
C. J. Cross Mfg. Co., Inc., N. Y.
Foamite-Childs Co., Utica, N. Y.
Pyrene Mfg. Co., Newark, N. J.

FIRE HOSE (See Hose, Fire)

FIRST AID EQUIPMENT
American-La France Fire Engine Co., Elmira, N. Y.

FITTINGS, ACID RESISTING
*Barber Asphalt Co., Philadelphia

FLEXIBLE JOINTS
*Central Foundry Co., N. Y.
*U. S. C. I. Pipe & Fdry Co., Burlington, N. J.
Coldwell-Wilcox Co., Newburgh, N. Y.
Crane Co., Chicago.
United Lead Company, N. Y.

FLOOR PLATES
Amer. Pressed Steel Co., Phila.
Central Ir. & Stl. Co., Harrisburg, Pa.
Allan Wood, Iron & Steel Co., Phila.

FLOORING, COMPOSITION
*Barber Asphalt Co., Phila., Pa.
*Barrett Co., N. Y.
Am. Mason Safety Tr. Co., Lowell, Mass.
Johns-Manville, Inc., N. Y.
Marino Decking & Sup. Co., Phila., Pa.
Franklyn R. Muller & Co., Waukegan, Ill.

FLOORS, WOOD BLOCK
*Barrett Co., N. Y.
Carter Bloxonend Flooring Co., Kansas City, Mo.
Jennison-Wright Co., Toledo, O.
Midland Creos. Co., Toledo, O.
Republic Creos. Co., Indianapolis, Ind.
Sou. Wood Preserving Co., Atlanta, Ga.
Wyckoff Pipe & Creos. Co., N. Y.

FINISHING MACHINES, CONCRETE ROAD (See Concrete Road Finishers)

FLUSH TANKS
*Pacific Flush Tank Co., Chicago & N.Y.

FLUSHERS, STREET (See Street Flushers and Sprinklers)

FORD AND FORDSON EQUIPMENT

AIR COMPRESSORS FOR FORDSONS
*Curtis Pneum. Mach. Co., St. Louis.
*Ingersoll-Rand Co., New York
Schramm, Inc., West Chester, Pa.

AIR COMPRESSORS FOR FORD TRUCKS
*Buhl Co., Chicago.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Ingersoll-Rand Co., New York
Schramm, Inc., West Chester, Pa.

BACKFILLERS
Waterman Corp., Detroit

CONCRETE MIXERS ON FORD TRUCKS
*Amer. Cem. Mach. Co., Keokuk, Ia.
Archer Iron Wks., Chicago
Milwaukee Conc. Mixer Co., Milwaukee.

DUMP BODIES FOR FORD TRUCKS
*Anthony Co., Streator, Ill.
*Eagle Wagon Wks., Auburn, N. Y.
*Easton Car & Const'n Co., Easton, Pa.
*Heil Co., Milwaukee, Wis.
*Highway Trailer Co., Edgerton, Wis.
*Marion Steel Body Co., Marion, O.
*N. Y. Cent. Iron Wks. Co., Inc., Hagerstown, Md.
*Stewart Iron Wks. Co., Cincinnati, O.
*Superior Body Corp., Marion, Ind.
*Wood Hydr. Hoist & Body Co., Detroit.
American Prod. & Trad. Co., Chicago.
Archer Iron Works, Chicago.
Columbian Stl. Tank Co., K. City, Mo.
Ditwiler Mfg. Co., Galion, O.
Galion All Steel Body Co., Galion, O.
Griscom-Russell, N. Y.
Herr Dump Body Mfg. Co., Coatesville, Pa.
Hughes-Keenan Co., Mansfield, O.
Jennings Auto. Dump Body Co., Roanoke, Va.
Lee Trailer & Body Co., Chicago.
Mandt Co., Keokuk, Ia.
Martin-Parry Corp., York, Pa.
Pechstein Iron Works, Keokuk, Ia.
Thompson Mfg. Co., Williston, S. C.
Van Dorn Iron Wks., Cleveland, O.

FORD MOTOR PUMPER
*American Steam Pump Co., Battle Creek, Mich.

FORD PLOWS
*Roderick Lean Mfg. Co., Mansfield, O.

FORD REPLACEMENT UNITS (AXLES AND TRANMISSIONS)
*Fuller & Sons Mfg. Co., Kalamazoo.
*Waukesha Motor Co., Waukesha, Wis.
*Warford Corp., N. Y.
Hinkley Motors, Inc., Detroit
Ruckstell Sales & Mfg. Co., N. Y.

FORD SPECIAL BODIES
Standard Comm. Body Corp., B'klyn.

FORD TRUCK EXTENSION FRAMES
Swedish Crucible Steel Co., Detroit.

FORDSON DITCHING MACHINE
Chas. T. Topping, Dayton, O.

FORDSON HOISTS
*Clyde Ir. Wks. Sales Co., Duluth, Minn.

If you find any errors or omissions in this Where to Purchase list, please send corrections to
CONTRACTORS' & ENGINEERS' MONTHLY

number one in March
number two in October
number three in November

THE South Shore Motor Transportation Company, Patchogue, New York, purchased their first Speeder in March, 1926. In October they bought their second, and in November their third machine. They operate shovel, pull shovel, crane and dragline attachments.

These machines are only three of the many Speeders working on Long Island.

SPEEDER
MACHINERY CORPORATION
1201 South Sixth Street, W.
Cedar Rapids, Iowa
90 West Street, New York
1032 Sixth Avenue South, Seattle

Fitted with Missabe type dipper for extra heavy service

SHOVELS SPEEDER CRANES

Where to Purchase

Erated Mach. Mfg. Co., Portland, Ore.
Okla. Eng. & Fdry. Co., Muskogee, Okla.
Otis Eng. Corp., N. Y.
Sheffield Tool & Sup. Co., Sheffield, Pa.
Squier-Rix Co., Milwaukee.

FORDSON LOCOMOTIVES
Brookville Truck & Tractor Co., Brookville, Pa.

FORDSON POWER SHOVELS
*Anthony Co., Streator, Ill.
*Insley Mfg. Co., Indianapolis, Ind.
Mandt Company, Keokuk, Ia.
Milwaukee Elec. Crane & Mfg. Co., Milwaukee.
Squier-Rix Co., Milwaukee.

FORDSON ROAD GRADERS
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Good Rds. Mach. Co., Kennett Sq., Pa.
*Hadfield-Penfield Stl. Co., Bucyrus, O.
*Shaw-Enochs Tractor Co., Minneapolis
*Russell Grader Mfg. Co., Minneapolis
J. D. Adams & Co., Indianapolis, Ind.
C. D. Edwards Mfg. Co., Albert Lea, Minn.
Gilbert Mfg. Co., Aberdeen, S. D.
Wehr Co. Milwaukee, Wis.

FORDSON ROAD ROLLERS
*Acme Road Mchy. Co., Frankfort, N. Y.
*Austin-Western Rd. Mach. Co., Chicago.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Good Rds. Mchy. Co., Kennett Sq., Pa.
Horst & Strieter Co., Davenport, Ia.

FORDSON SAW RIGS
*Amer. Saw Mill Mchy. Co., Hackettstown, N. J.

FORDSON SCRAPER OUTFITS
*Miami Trailer-Scraper Co., Troy, O.
Killefer Mfg. Co., Los Angeles, Calif.
Miskin Scraper Wks., Ucon, Idaho.
Gustav Schaefer Wagon Co., Cleveland, O.

FORDSON TRACTION TREADS
*Full-Crawler Co., Milwaukee, Wis.
*Tractor Grip Wheel Co., Toledo, O.
Belle City Mfg. Co., Racine, Wis.

FORDSON TRACTOR TRUCKS
Toppins Trac. Truck Co., Appleton, Wis.

FORDSON TRAILER EQUIPMENT
*Easton Car & Const'n Co., Easton, Pa.
*Miami Trailer-Scraper Co., Troy, O.
Trail-Ford Corp., Ann Arbor, Mich.
Trailmobile Co., Cincinnati, O.
Troy Trailer & Wagon Co., Troy, O.
Whitehead & Kales Co., Detroit.

FORDSON TRUCK LOADERS
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*George Haiss Mfg. Co., N. Y.
*Spears-Wells Mchy. Co., Oakland, Cal.
Lessman Loader Mfg. Co., Des Moines, Ia.
*Nelson Iron Wks., Passaic, N. J.
Specialty Eng. Co., Philadelphia, Pa.

FORGES
*Hauck Mfg. Co., B'lyn, N. Y.
Buffalo Forge Co., Buffalo, N. Y.

FORGES, OIL (Rivet Heating)
*Hauck Mfg. Co., B'klyn, N. Y.
*Mead-Morrison Mfg. Co., E. Boston.

FORM CLAMPS
*Insley Mfg. Co., Indianapolis, Ind.
*M. & M. Wire Clamp Co., Minneapolis
Marion Mall. Iron Wks., Marion, Ind.
Universal Form Clamp Co., Chicago.
Williams Form Clamp Co., Chicago

FORMS, CONCRETE
*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Phila., Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.
*Hotchkiss Stl. Products Co., Binghamton, N. Y.
*Lakewood Eng. Co., Cleveland, O.
*Truscon Steel Co., Youngstown, O.
Concrete Form Co., Inc., Syracuse, N.Y.
Metal Forms Corp., Milwaukee.
Raber & Lang Mfg. Co., Kendallville, Ind.

FORMGRADERS
Edward G. Carr, Chicago.

FORMS, MANHOLE PIPE, SEWER, ETC.
*Heltzel Stl. Form & Ir. Co., Warren, O.

FOUNTAINS, DRINKING
Casey-Hedges Co., Chattanooga, Tenn.
Jas. B. Clow & Sons, Chicago.
Crane Co., Chicago.
Murdock Mfg. & Sup. Co., Cincinnati.
Puro San. Dr. Ftn. Co., Haydenville, Mass.
Rundle-Spence Mfg. Co., Milwaukee.
Stewart Iron Wks. Co., Cincinnati, O.
Halsey W. Taylor Co., Warren, O.
Century Brass Wks., Belleville, Ill.

FURNITURE AND FILES, STEEL
Art Metal Const. Co., Jamestown, N.Y.
Gen. Fireproofing Co., Youngstown, O.
Van Dorn Ir. Wks. Co., Cleveland, O.

FURRING AND SLEEPER ANCHORS
Dayton Sure Grip & Shore Co., Dayton, O.

GARBAGE CANS (See Cans)

GARBAGE DISPOSAL
American Beccari Corp., N. Y.
C. O. Bartlett & Snow Co., Cleveland, O.
Decarie Incinerator Co., L. I. C., N. Y.
Goder Incinerator Corp., Chicago.
Hiler Eng. & Const. Co., B'klyn, N. Y.
Morse-Boulger Destructor Co., N. Y.
Nye Odorless Crematory Co., Macon, Ga.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.

GARBAGE TRAILERS AND BODIES
*Highway Trailer Co., Edgerton, Wis.
*Littleford Bros., Cincinnati
Atlia Corp., New York
Lee Trailer & Body Co., Chicago

GARBAGE TRUCKS
*Heil Co., Milwaukee, Wis.
*Rex-Watson Corp., Canastota, N. Y.
Geo. H. Holzbog & Bro., Jeffersonville, Ind.
Lee Trailer & Body Co., Chicago.
Tiffin Wagon Co., Tiffin, O.

GAS METERS (See Meters, Gas)

GAS PRODUCERS
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
R. D. Wood & Co., Phila., Pa.

GASOLINE STORAGE TANKS
*Heil Co., Milwaukee, Wis.
*Littleford Bros., Cincinnati, O.
Biggs Boiler Works, Akron, O.
Birmingham Tank Co., B'mingham, Ala.
S. P. Bowser & Co., Inc., Ft. Wayne, Ind.
Chicago Bridge & Iron Wks., Chicago.
Graver Corp., E. Chicago, Ind.
Wm. B. Scaife & Sons, Pittsburgh, Pa.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
United Iron Wks., Inc., K. City, Mo.
Wayne Tank & Pump Co, Ft. Wayne, Ind.

GATES, SLUICE
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston, Mass.
Coldwell-Wilcox Co., Newburgh, N. Y.
R. Hardesty Mfg. Co., Denver.
Ludlow Valve Mfg. Co., Troy, N. Y.

GATES FOR PARKS AND CEMETERIES
*Stewart Iron Wks. Co., Cincinnati, O.

GAUGES, WATER
Bristol Co., Waterbury, Conn.
Lunkenheimer Co., Cincinnati, O.
Walworth Mfg. Co., Boston.

GUAGES, SURFACE, RESERVOIR AND SPECIAL WATER-WORKS
Builders Iron Fdry., Providence, R. I.
Simplex Valve & Meter Co., Phila., Pa.

GLASS, FIREPROOF (See Wire Glass)

GOVERNORS, GASOLENE ENGINE
*Pickering Governor Co., Portland, Ct.

GRADERS, ROAD (See Road Graders)

GRADER BLADES
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Russell Grader Mfg. Co., Minneapolis
*Shunk Mfg. Co., Bucyrus, O.
J. D. Adams & Co., Indianapolis, Ind.

GRAND STANDS, PORTABLE
Circle A. Prod. Corp., Newcastle, Ind.
Leavitt Mfg. Co., Urbana, Ill.
Wayne Iron Wks., Wayne, Pa.

GRATING, STEEL
*Blaw-Knox Co., Pittsburgh

GREASE
*Dixoyl, Inc., St. Louis

GRINDERS AND SAND RAMMERS
*Ingersoll-Rand Co., N. Y.
Chicago Pneum. Tool Co., N. Y.
Cleveland Pneum. Tool Co., Cleveland, O.

GYPSUM PRODUCTS
U. S. Gypsum Co., Chicago.
Fenton Mfg. Co., Cleveland, O.

HAMMERS, STEAM, PILE (See Pile Hammers, Steam)

HEAT INSULATING MATERIAL
*Philip Carey Co., Cincinnati, O.
Johns-Manville, Inc., N. Y.

HEATING KETTLES (See Kettles)

HITCHES
Fenton Mfg. Co., Cleveland, O.
Gustav Schaefer Wagon Co., Cleveland, O.

HOISTS, AUTOMATIC
*Zetterlund Hst. & Mach. Co. Milwaukee

HOISTS, BELT-DRIVEN
*Amer. Saw Mill Mchy. Co., Hackettstown, N. J.
*Dobbie Fdry. & Mach. Co., Niagara Falls.
*Harnischfeger Corp., Milwaukee, Wis.
*Mead-Morrison Mfg. Co., E. Boston, Mass.
*Mundy Sales Corp., N. Y.
*Street Bros. Mach. Wks., Chatta., Tenn.
American Hoist & Derrick Co., St. Paul, Minn.
Lidgerwood Manufacturing Co., N. Y.
Weller Mfg. Co., Chicago.

HOISTS, CONCRETE, TOWER
*English Bros. Mach'y Co., Kansas City
*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Eng. Co., Cleveland, O.
*Mead-Morrison Mfg. Co., East Boston
*Ransome Conc. Mchy. Co., Dunnellen, N.J.
*Street Bros. Mach. Wks., Chattanooga
Lidgerwood Manufacturing Co., N. Y.

For Backfilling

in cramped quarters and on soft ground, the Trackson Full-Crawler-equipped Fordson is the most economical 2-ton tractor.

Its extra weight and increased power let the blade dig deeper and do more work at low cost.

Its ground-gripping and quick easy steering make it fine for trench filling and other work in cramped quarters.

Its ring-oiled lubrication, dirt-proof bearings, and all-steel construction give it the strength to stand up and keep going day after day.

Its low purchase price and cheap operating cost make it easy to buy and economical to keep running.

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The Full-Crawler Co.

Dept. of Geo. H. Smith Steel Casting Co.

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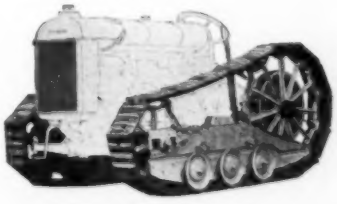

Trackson
Full-Crawler for Fordsons

Where to Purchase

HOISTS, ELECTRIC
*Clyde Iron Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls
*English Bros. Mach'y Co., Kansas City
*S. Flory Mfg. Co., Bangor, Pa.
*Harnischfeger Corp., Milwaukee.
*Mead-Morrison Mfg. Co., E. Boston.
*Mundy Sales Corp., N. Y.
*O.K. Clutch & Mach. Co., Columbia., Pa.
*Street Bros. Mach. Wks., Chatta., Tenn.
*Vulcan Iron Wks., Wilkes-Barre, Pa.
Am. Hoist & Derrick Co., St. Paul, Minn.
Chisholm-Moore Co., Cleveland, O.
Ntl. Hoisting Eng. Co., Harrison, N. J.
Lidgerwood Manufacturing Co., N. Y.
Thomas Elev. Co., Chicago.
Treadwell Eng. Co., Easton, Pa.

HOISTS, GASOLINE
*Am. Cem. Mchy. Co., Inc., Keokuk, Ia.
*Amer. Saw Mill Mchy. Co., Hackettstown, N. J.
*Clyde Iron Wks. Sales Co., Duluth, Minn.
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*English Bros. Mach'y Co., Kansas City
*S. Flory Mfg. Co., Bangor, Pa.
*Harnischfeger Corp., Milwaukee.
*Mead-Morrison Mfg. Co., E. Boston.
*Mundy Sales Corp., N. Y.
*Nove Engine Co., Lansing, Mich.
*O.K. Clutch & Mach. Co., Columbia, Pa.
*Pioneer Tractors, Inc., Winona, Minn.
*Street Bros. Mach. Wks., Chatta., Tenn.
Amer. Hoist & Der. Co., St. Paul, Minn.
Amer. Mfg. & Eng. Co., Kalamazoo, Mich.
Buffalo Hoist & Derrick Co., Buffalo, N. Y.
C. H. & E. Mfg. Co., Milwaukee
Construction Mchy. Co., Waterloo, Ia.
Ersted Mchy. Mfg. Co., Portland, Ore.
Lansing Co., Lansing, Mich.
Lidgerwood Manufacturing Co., N. Y.
Ntl. Hoisting Eng. Co., Harrison, N. J.
Orr & Sembower, Reading, Pa.
Schramm, Inc., West Chester, Pa.
Squier-Rix Co., Milwaukee.
Thomas Elevator Co., Chicago

HOISTS, PNEUMATIC
*Curtis Pneum. Mchy. Co., St. Louis
*Dake Engine Co., Grand Haven, Mich.
*Denver Rock Drill Mfg. Co., Denver.
*Ingersoll-Rand Co., N. Y.
*Mead-Morrison Mfg. Co., E. Boston.
*Sullivan Mchy. Co., Chicago.
Chicago Pneumatic Tool Co., N. Y.
Detroit Hoist & Mach. Co., Detroit.
Gilman Mfg. Co., E. Boston, Mass.
Hanna Eng. Works, Chicago.
Independent Pneum. Tool Co., Chicago.
Northern Eng. Wks., Detroit, Mich.
Worthington Pump & Mchy. Corp., N.Y.

HOISTS, STEAM
*Clyde Iron Wks. Sales Co., Duluth, Minn.
*Dake Eng. Co., Grand Haven, Mich.
*Denver Rock Drill Mfg. Co., Denver.
*S. Flory Mfg. Co., Bangor, Pa.
*Ingersoll-Rand Co., N. Y.
*Insley Mfg. Co., Indianapolis, Ind.
*Mead-Morrison Mfg. Co., E. Boston.
*Mundy Sales Corp., N. Y.
*Street Bros. Mach. Wks., Chattanooga
Amer. Hoist & Derrick Co., St. Paul, Minn.
Hardie-Tynes Mfg. Co., B'mingham, Ala
Lidgerwood Manufacturing Co., N. Y.
Ntl. Hoisting Eng. Co., Harrison, N. J.
Orr & Sembower, Reading, Pa.
Thomas Elev. Co., Chicago.
Treadwell Eng. Co., Easton, Pa.

HOISTS FOR MOTOR TRUCKS
*Heil Co., Milwaukee.
*Wood Hydr. Hoist & Body Co., Detroit.
Atla Corp., New York
Hydr. Hoist Mfg. Co., St. Paul, Minn.
Lidgerwood Manufacturing Co., N. Y.
Rock Mfg. Co., Waterloo, N. Y.
Superior Body Corp., Marion, Ind.
Van Dorn Iron Wks., Cleveland, O.

HOPPERS, CONCRETE (Aggregate Measuring)
*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Eng. Co., Cleveland, O.
*Littleford Bros., Cincinnati, O.
*Ransome Conc. Mchy. Co., Dunellen, N.J.
Jas. B. Seaverns Co., Chicago

HOSE, AIR
*The Dallett Co., Phila., Pa.
*Ingersoll-Rand Co., N. Y.
Chicago Pneumatic Tool Co., N. Y.
Cincinnati Rubber Mfg. Co., Cincinnati.
Cleveland Rock Drill Co., Cleveland, O.
Gilman Mfg. Co., E. Boston, Mass.
Goodyear Tire & Rubber Co., Akron, O.
Mulconroy Co., Inc., Phila., Pa.
Penna. Flexible Metallic Tubing Co., Phila., Pa.
Republic Rubber Co., Youngstown, O.
U. S. Rubber Co., N. Y.

HOSE, FIRE
Bi-Lateral Fire Hose Co., Chicago.
Eureka Fire Hose Mfg. Co., N. Y.
Fabric Fire Hose Co., N. Y.
B. F. Goodrich Rubber Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.

HOUSE MOVING EQUIPMENT
*La Plant-Choate Mfg. Co., Cedar Rapids, Ia.

HOUSE NUMBERS
Hamilton Metal Prod. Co., Hamilton, O.
Niagara Metal Stamping Corp., Niagara Falls, N. Y.

HOUSES, PORTABLE (See Buildings, Portable)

HYDRANTS, FIRE
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Columbian Ir. Wks., Chatta., Tenn.
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve & Mfg. Co., Waterford, N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N.Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Norwood Eng. Co., Florence, Mass.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
R. D. Wood & Co., Phila., Pa.

HYDRAULIC RAMS
Deming Co., Salem, O.
Rife Hydraulic Engine Co., N. Y.
Rumsey Pump Co., Seneca Falls, N.Y.
Seattle Mach. Works, Seattle, Wash.

ICE-MAKING MACHINERY
*Ingersoll-Rand Co., New York
Arctic Ice Mach. Co., Canton, O.
Baker Ice Mach. Co., Omaha, Neb.
Brunswick-Kroeschell Co., N. Brunswick, N. J.
Carbondale Mach. Co., Carbondale, Pa.
De La Vergne Mach. Co., N. Y.
Frick Co., Inc., Waynesboro, Pa.
Triumph Ice Mach. Co., Cincinnati, O.
United Iron Wks., Inc., K. City, Mo.
Vilter Mfg. Co., Milwaukee, Wis.
Henry Vogt Mach. Co., Louisville, Ky.
York Mfg. Co., York, Pa.

INCINERATORS, GARBAGE (See Garbage Disposal)

INDICATOR POSTS (See Valves)

INSPECTING LABORATORIES
*Conard & Busby, Burlington, N. J.
*Pittsburgh Testing Lab., Pittsburgh
Allentown Testing Lab., Allentown, Pa.
E. L. Conwell & Co., Phila., Pa.
Gulick-Henderson Co., N. Y.
Robert W. Hunt & Co., Chicago.
N. Y. Testing Lab., N. Y.
Standard Testing Lab., Inc., N. Y.

INSTRUMENTS AND SUPPLIES (Surveyors' and Engineers')
Wm. Ainsworth & Sons, Denver, Col.
L. Beckman Co., Toledo, O.
C. L. Berger & Sons, Boston.
Brandis & Sons Mfg. Co., B'klyn, N.Y.
Buff & Buff Mfg. Co., Boston.
Eugene Dietzgen Co., Chicago.
W. & L. E. Gurley, Troy, N. Y.
Keuffel & Esser Co., Hoboken, N. J
A. Lietz Co., San Francisco.
Leupold-Volpel & Co., Portland, Ore.
Warren Knight Co., Phila., Pa.
F. Weber & Co., Phila., Pa.
David White Co., Milwaukee, Wis.

INTEGRAL CURB AND BASE FORMS (See "Forms, Concrete")

IRON WORK, STRUCTURAL AND ORNAMENTAL (See Bridges and Buildings)

JACKS, LIFTING
*McKiernan-Terry Drill Co., N. Y.
*Oil Jack Co., N. Y.
Duff Mfg. Co., Pittsburgh, Pa.
Joyce-Cridland Co., Dayton, O.
A. O. Norton, Inc., Boston.
Rees Mfg. Co., Pittsburgh, Pa.
Templeton, Kenly & Co., Ltd., Chicago.
Watson-Stillman Company, N. Y.

JACKS, PIPE FORCING
Duff Mfg. Co., Pittsburgh, Pa.

JAIL AND PRISON WORK
*Stewart Iron Wks. Co., Cincinnati, O.
E. T. Barnum Iron Wks., Detroit.
Fries & Son Steel Const. & Eng. Co., Covington, Ky.
Pauly Jail Bldg. Co., St. Louis, Mo.
Van Dorn Ir. Wks. Co., Cleveland, O.

JOINTS, EXPANSION PAVING (See Expansion Joint Material)

JOINTS, FLEXIBLE PIPE (See Flexible Joints)

JOISTS, STEEL
*Truscon Steel Co., Youngstown, O.
Berger Mfg. Co., Canton, O.
Gen'l Firepfg. Bldg. Products, Youngstown, O.

KETTLES, FOR ASPHALT AND TAR
*Acme Rd. Mach. Co., Frankfort, N. Y.
*Aeroil Burner Co., Union Hill, N. J.
*Barber Asphalt Co., Phila., Pa.
*Chausse Oil Burner Co., Elkhart, Ind.
*Connery & Co., Inc., Phila., Pa.
*Good Eds. Mchy. Co., Kennett Sq., Pa.
*Hauck Mfg. Co., B'klyn, N. Y.
*Jos. Honhorst Co., Cincinnati, O.
*Kinney Mfg. Co., Boston, Mass.
*Littleford Bros., Cincinnati, O.
*Spears-Wells Mchy. Co., Oakland, Cal.
*Union Iron Wks., Inc., Hoboken, N. J.
*Universal Rd. Mach. Co., Kingston, N.Y.
Birmingham Tank Co., Birmingham, Ala.
Chase & Lyman, Boston, Mass.
Macleod Co., Cincinnati, O.
G. L. Stuebner Ir. Wks., Inc., Long Island City, N. Y.
Tarrant Mfg. Co., Saratoga Spgs., N. Y.

LANTERNS, CONTRACTORS'
*Alex. Milburn Co., Baltimore, Md.
Defiance Lantern & Stamping Co., Rochester, N. Y.
R. E. Dietz Co., N. Y.

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CONTRACTORS' & ENGINEERS' MONTHLY

BOSS
ONE-TWO BAGGER

$10,000,000 Project

Two BOSS Mixers, One-Two Bagger Size, now being used on this main building of World War Memorial, a Ten Million Dollar Project at Indianapolis, Indiana.

OK'ed by 17,500 Users

A Sensibly Sized Mixer For Any Job~

Weighs No More-Costs No More

Than Some One-Sack Mixers

ONE BAG ANY PROPORTION--or--2 Bags 1-2-5 Mix

Built of Steel—Extremely compact. Patented discharge and mixing action allows 25 to 30 more batches daily. High speed loading, mixing and discharging actions with maximum capacity is the answer to the demands of contractors for an all purpose 10S One-Two Bagger at a reasonable price.

Write for New 1927 Catalog and Low Prices

BOSS Catalog GC27 on complete line, just off the press. New models and improvements in 3S, 7S, 10S, 14S, 21S, 28S Drum Mixers, Heavy Duty Tilters, All-Purpose Hoists. Prices that will surprise you. Get your copy of BOSS Catalog GC27 with full descriptions and complete price list today.

The American Cement Machine Company, Inc.

KEOKUK, IOWA DEPT. 237

Branch Offices and Warehouses
Chicago, Los Angeles, Seattle, Kansas City, Minneapolis, San Francisco, Dallas, Cambridge, Mass., Buffalo, Montreal, Pittsburgh, Milwaukee

CHICAGO ROAD SHOW BOOTH NC-29

JAN. 10 to 14, 1927

Branch Offices and Warehouses
St. Louis, Louisville, Knoxville, Tulsa, New York, Detroit, Philadelphia, Salt Lake City, Atlanta, Indianapolis, New Orleans, Washington, D. C.

Handlan, Buck Mfg. Co., St. Louis.
Star Headlight & Lantern Co., Rochester, N. Y.

LATH, METAL
*Truscon Steel Co., Youngstown, O.
Berger Mfg. Co., Canton, O.
Bostwick Steel Lath Co., Niles, O.
Gen. Fireproofing Co., Youngstown, O.
Milwaukee Corr. Co., Milwaukee, Wis.
Northwestern Exp. Metal Co., Chicago.
Penn. Metal Co., Boston, Mass.
Sykes Metal Lath & Roofing Co., Niles, O.
Youngstown Pressed Steel Co., Warren, O.

LAWN MOWERS
Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.
Coldwell Lawn Mower Co., Newburgh, N.Y.
Gilson Mfg. Co., Port Washington, Wis.
Ideal Power Lawn Mower Co., Lansing, Mich.
Jacobsen Mfg. Co., Racine, Wis.
Penna. Lawn Mower Wks., Phila., Pa.
Phila. Lawn Mower Co., Phila., Pa.
S. P. Townsend Co., Bloomfield, N. J.
Western Implement Co., Port Washington, Wis.
Worthington Mower Co., Stroudsburg, Pa.

LEADITE
The Leadite Co., Phila., Pa.

LEAD-MELTING FURNACES
*Aeroil Burner Co., Union Hill, N. J.
*Hauck Mfg. Co., B'klyn, N. Y.
*Littleford Bros., Cincinnati, O.
Canton Fdry. & Mchy. Co., Canton, O.
Chicago Flexible Shaft Co., Chicago.
Geo. Focht's Sons, Hoboken, N. J.
A. P. Smith Mfg. Co., E. Orange, N. J.

LETTERING GUIDES
Wood-Regan Instrument Co., N. Y.

LETTERS AND FIGURES, METAL
Niagara Metal Stamp. Corp., Niagara Falls, N. Y.

LIGHTS, CONTRACTORS'
*Hauck Mfg. Co., B'klyn, N. Y.
*Alex. Milburn Co., Baltimore, Md.
Carbic Mfg. Co., Duluth, Minn.
General Elec. Co., Schenectady, N. Y.
Macleod Co., Cincinnati, O.
Prest-O-Lite Co., Inc., N. Y.

LIGHTING STANDARDS (See Street Lamp Posts)

LIQUID CHLORINE
Arnold, Hoffman & Co., Inc., N. Y.
Electro Bleaching Gas Co., N. Y.
Hooker Electrochemical Co., N. Y.
Mathieson Alkali Works, Inc., N. Y.
Penna. Salt Mfg. Co., Phila., Pa.

LOADERS, GRAVEL, WAGON, CAR, ETC.
*Atlas Eng. Co., Milwaukee, Wis.
*Barber-Greene Co., Aurora, Ill.
*Bay City Dredge Wks., Bay City, Mich.
*Chicago Automatic Conv. Co., Chicago
*Chain Belt Co., Milwaukee, Wis.
*Gallon Ir. Wks. & Mfg. Co., Gallon, O.
*Geo. Haiss Mfg. Co., N. Y.
*Heltzel Stl. Form & Ir. Co., Warren, O.
*Link-Belt Co., Chicago
*Nelson Iron Wks., Passaic, N. J.
*Russell Grader Mfg. Co., Minneapolis.
*Sauerman Bros., Chicago.
*T. L. Smith Co., Milwaukee, Wis.
*Spears-Wells Mchy. Co., Oakland, Cal.
*Universal Rd. Mach. Co., Kingston, N.Y.
Austin Mach. Corp., Muskegon, Mich.
Bonney Supply Co., Inc., Rochester, N.Y.
Brown Hoisting Mchy. Co., Cleveland.
Conant Mach. Co., Concord Junct., Mass.
Fairfield Eng. Co., Marion, O.
Gifford-Wood Co., Hudson, N. Y.
Jeffrey Mfg. Co., Columbus, O.
Lee Trailer & Body Co., Chicago.
Portable Mchy. Co., Passaic, N. J.
H. B. Sackett Screen & Chute Co., Chicago.
Schofield-Burkett Const'n Co., Macon, Ga.
Specialty Eng. Co., Phila., Pa.
Squier-Rix Co., Milwaukee.
Weller Mfg. Co., Chicago.

LOCKERS, STEEL
Durand Steel Locker Co., Chicago.
Hart & Hutchinson Co., N. Britain, Ct.
Lyon Metallic Mfg. Co., Aurora, Ill.
Fred. Medart Mfg. Co., St. Louis, Mo.

LOCOMOTIVES, FOR CONTRACTORS, ETC.
*Vulcan Iron Wks., Wilkes-Barre, Pa.
*Geo. D. Whitcomb Co., Rochelle, Ill.
Baldwin Loc. Wks., Phila., Pa.
Brookville Track & Tractor Co., Brookville, Pa.
Davenport Loc. Wks., Davenport, Ia.
Fate-Root-Heath Co., Plymouth, O.
Heisler Locomotive Wks., Erie, Pa.
Mid-West Locomotive Wks., Cincinnati
Lima Loc. Wks., Lima, O.
Milwaukee Loc. Mfg. Co., Milwaukee.
Plymouth Loc. Wks., Plymouth, O.
H. K. Porter Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

LUBRICANTS
*D-A Lubricant Co., Ind'p'l's, Ind.
*Dixoyl, Inc., St. Louis

MANHOLE COVERS (See Castings)

METAL LATH (See "Lath")

METAL ROOFING (See "Roofing")

METER BOXES
H. W. Clark Co., Mattoon, Ill.
Clarksville Fdry. & Mach. Wks., Clarksville, Tenn.
J. B. Clow & Sons, Chicago.
Columbian Ir. Wks., Chattanooga, Tenn.
Ford Meter Box Co., Wabash, Ind.
Mueller Co., Decatur, Ill.
J. S. Schofield's Sons Co., Macon, Ga.

METER COUPLINGS
*Neptune Meter Co., N. Y.
*Pittsburgh Meter Co., Pittsburgh, Pa.
*Union Water Meter Co., Worcester, Mass.
H. W. Clark Co., Mattoon, Ill.
Ford Meter Box Co., Wabash, Ind.
Mueller Co., Decatur, Ill.

METER TESTERS
*Neptune Meter Co., N. Y.
*Pittsburgh Meter Co., Pittsburgh, Pa.
H. W. Clark Co., Mattoon, Ill.
Ford Meter Box Co., Wabash, Ind.
Mueller Co., Decatur, Ill.
National Meter Co., N. Y.

METERS, ELECTRIC (WATTHOUR)
Duncan Elec. Mfg. Co., LaFayette, Ind.
General Elec. Co., Schenectady, N. Y.
Sangamo Elec. Co., Springfield, Ill.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

METERS, Gas
*Pittsburgh Meter Co., Pittsburgh, Pa.
American Meter Co., N. Y.
Bailey Meter Co., Cleveland, O.
Builders Iron Fdry., Providence, R. I.
Cleveland Gas Meter Co., Cleveland, O.

METERS, WATER, OIL & GASOLINE
*Neptune Meter Co., N. Y.
*Pittsburgh Meter Co., Pittsburgh, Pa.
*Union Water Meter Co., Worcester, Mass.
Badger Meter Mfg. Co., Milwaukee.
Buffalo Meter Co., Buffalo, N. Y.
Federal Motor Corp'n, E. Orange, N. J.
Gamon Meter Co., Newark, N. J.
Hersey Mfg. Co., Boston, Mass.
National Meter Co., N. Y.
Thomson Meter Co., B'klyn, N. Y.
Worthington Pump & Mchy. Corp., N.Y.

METERS, WATER (VENTURI TYPE)
Builders Iron Fdry., Providence, R. I.
Simplex Valve & Meter Co., Phila., Pa.

MIXERS, CONCRETE (See Concrete Mixers)

MIXERS, GROUT
*Am. Cem. Mchy. Co., Inc., Keokuk, Ia.
*Lakewood Eng. Co., Cleveland, O.
*T. L. Smith Co., Milwaukee, Wis.
*Union Iron Wks., Inc., Hoboken, N. J.
Kent Mach. Co., Kent, O.

MIXERS, HOT
*Barber Asphalt Co., Phila., Pa.
*Koehring Co., Milwaukee, Wis.

MIXERS, MORTAR
*Am. Cem. Mchy. Co., Inc., Keokuk, Ia.
*Blaw-Knox Co., Pittsburgh, Pa.
*Blystone Mfg. Co., Cambridge Spgs., Pa.
*Kiel Mach. Co., Kiel, Wis.
*Lakewood Eng. Co., Cleveland, O.
*Lakewood Eng. Co., Cleveland, O.
*Ransome Conc. Mchy. Co., Dunellen, N.J.
*T. L. Smith Co., Milwaukee, Wis.
Anchor Mfg. Co., Chicago.
Austin Mach. Corp., Muskegon, Mich.
C. H. & E. Mfg. Co., Milwaukee, Wis.
Construction Mach. Co., Waterloo, Ia.
Kent Mach. Co., Kent, O.
Knickerbocker Co., Jackson, Mich.
Lansing Co., Lansing, Mich.
Marsh-Capron Co., Chicago
Talbot-Flood Mfg. Co., Kansas City, Mo.

MIXERS, PLASTER
*Blystone Mfg. Co. Cambridge Spgs., Pa.
Essick & Co., Los Angeles, Cal.
Talbot-Flood Mfg. Co., Kansas City, Mo.

MORTAR BOXES, STEEL
*Akron Barrow Co., Cleveland
*Littleford Bros., Cincinnati

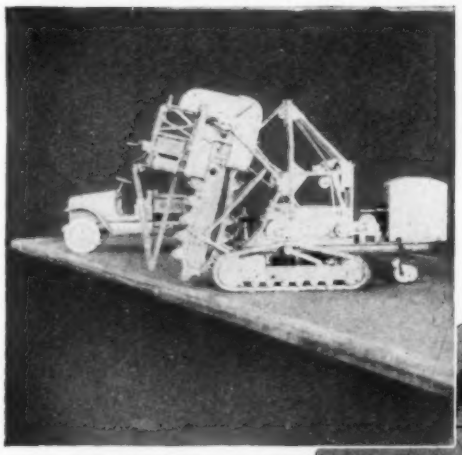
MOTORCYCLES
Cleveland Motorcycle Co., Cleveland, O.
Excelsior Motor Mfg. & Supply Co., Chicago.
Harley-Davidson Motor Co., Milwaukee
Indian Motocycle Co., Springfield, Mass.

MOTORS, ELECTRIC (See Electric Generators and Motors)

MOTORS, GASOLINE (See Engines, Gas and Gasoline)

MOTOR TRUCKS
*Ford Motor Co., Detroit.
*Graham Bros., Detroit
*Mack Trucks, Inc., New York
Acme Motor Truck Co., Cadillac, Mich.
Atterbury Motor Car Co., Buffalo, N.Y.
Autocar Co., Ardmore, Pa.
Bessemer Motor Truck Co., Grove City, Pa.
Brockway Motor Truck Co., Cortland, N. Y.
Clydesdale Motor Truck Co., Clyde, O.
Commerce Motor Trk. Co., Ypsilanti, Mich.
Diamond T. Motor Car Co., Chicago.
Federal Motor Truck Co., Detroit.
Four Wheel Drive Auto Co., Clintonville, Wis.
Garford Truck Co., Lima, O.
Gramm Bernstein Tr. Corp., Lima, O.
Gramm & Kincaid Motors, Inc., Lima, O.
The Hug Co., Highland, Ill.
Indiana Truck Corp., Marion, Ind.
Int. Harvester Co., Chicago.
Kelly Springfield Motor Truck Co., Springfield, O.
Larrabee-Deyo Motor Tr. Co., Binghamton, N. Y.

Let These B-G Juniors Show You How Barber-Greenes Earn Profits

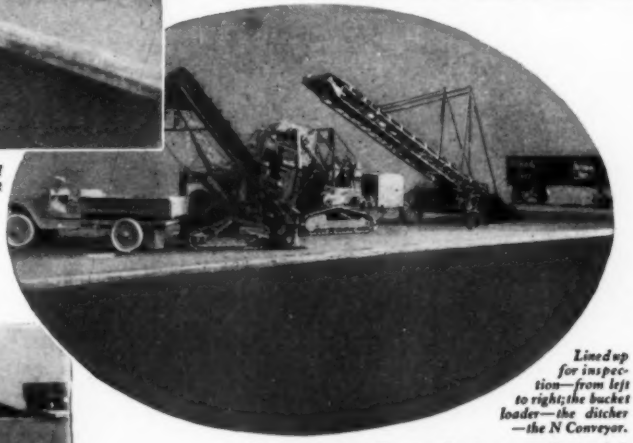


Here's The B-G Junior Ditcher—modeled closely after the famous "Ditcher that Couldn't be Built."

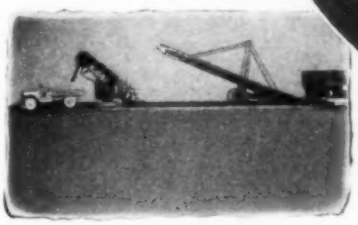
At the Road Show Booth No. 47

PERHAPS you've never seen the Barber-Greene Ditcher digging yard after yard of clean-cut trench—the Barber-Greene Loader sailing straight into a stock pile or embankment—or the Barber-Greene "N" Conveyor unloading loose material direct from a hopper-bottomed car.

If not, you will have a good chance to see what they can do—at the Chicago Road Show.



Lined up for inspection—from left to right; the bucket loader—the ditcher—the N Conveyor.



From car to storage to truck—B-G Juniors will demonstrate this job at the Road Show.

Three Barber-Greene Juniors—perfect miniature working models of the Bucket Loader, the Ditcher, and the Portable N-Conveyor, will be on the job. And they'll be proud to show you just how Barber-Greenes earn profits on every job they tackle.

See them any time between January 10th and 14th—at Booth No. 47 at the Road Show.

BARBER-GREENE COMPANY—*Representatives in 50 cities*—485 West Park Avenue, Aurora, Ill.

BARBER BELT CONVEYORS
Disc Feed Loaders

GREENE CAR UNLOADERS—COAL LOADERS
Vertical Boom Ditchers

Permanent Conveyors

Where to Purchase

Pierce-Arrow Motor Car Co., Buffalo.
Republic Truck Sales Corp., Alma, Mich.
Service Motor Tr. Co., Wabash, Ind.
Standard Motor Truck Co., Detroit.
Sterling Motor Truck Co., Milwaukee.
Stewart Motor Corp., Buffalo, N. Y.
Traffic Motor Tr. Co., St. Louis, Mo.
United Motor Products Co., Grand Rapids, Mich.
U. S. Motor Truck Co., Cincinnati, O.
White Co., Cleveland, O.
Yellow Truck & Coach Mfg. Co., Chicago

MOULDS, CONCRETE
*Blaw Knox Co., Pittsburgh, Pa.
Raber & Lang Mfg. Co., Kendallville, Ind.

MUCKING MACHINES
Hoar Shovel Co., Duluth, Minn.

NUMBERS HOUSE (See House Numbers)

OAKUM
Oxweld Acetylene Co., Long Island City, N. Y.

OIL BURNERS
*Aeroil Burner Co., Union Hill, N. J.
*Chausse Oil Burner Co., Elkhart, Ind.
*Hauck Mfg. Co., B'klyn, N. Y.
*Littleford Bros., Cincinnati
*Alex. Milburn Co., Baltimore, Md.
Binks Spray Equip. Co., Chicago

OILS, ROAD
*Barber Asphalt Co., Phila., Pa.
*Barrett Co., N. Y.
*Standard Oil Co. (Indiana), Chicago.
*Standard Oil Co. (N. Y.), N. Y.
*Texas Company, N. Y.
Atl. Ref. & Asp. Corp., Phila., Pa.
Headley Good Roads Co., Phila., Pa.
Pioneer Asp. Co., Lawrenceville, Ill.
Standard Oil Co. (La.), N. Orleans, La.
Standard Oil Co. (N. J.), Newark, N. J.

OXY-ACETYLENE APPARATUS
*Alex. Milburn Co., Baltimore, Md.
Oxweld Acetylene Co., Long Island City, N. Y.

PACKING, WATER PIPE
*Union Water Meter Co., Worcester, Mass.
The Leadite Co., Phila., Pa.
United Lead Company, N. Y.

PAINT GUNS
*Alex. Milburn Co., Baltimore, Md.
Binks Spray Eq. Co., Chicago
Chicago Pneum. Tool Co., New York
De Vilbiss Mfg. Co., Toledo, O.
Eclipse Air Brush Co., Newark, N. J.
W. N. Matthews Corp., St. Louis
Paasche Air Brush Co., Chicago
Simons Paint Spray Brush Co., Dayton, O.
Spraco Painting Equip. Co., Boston

PAINTS, METAL PROTECTION
*Barber Asphalt Co., Phila., Pa.
*Barrett Co., N. Y.
*Philip Carey Co., Cincinnati, O.
*Jos. Dixon Crucible Co., J. City, N. J.
*Solvay Sales Corp., N. Y.
Acme White Ld. & Col. Wks., Detroit.
Berry Bros., Detroit.
Cook Paint & Varnish Co., K. City, Mo.
Detroit Graphite Co., Detroit.
Detroit White Lead Wks., Detroit.
E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del.
Minwax Co., N. Y.
Protexol Corp., N. Y.
Ruberoid Co., N. Y.
Servicised Products Corp'n, Chicago
Sherwin-Williams Co., Cleveland, O.
L. Sonneborn Sons., Inc., N. Y.
Toch Bros., N. Y.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit.

PAPERS, BLUE PRINT
Ind'p'lis Blue Print & Supply Co., Ind'p'lis, Ind.

PARK BENCHES
*Stewart Iron Wks. Co., Cincinnati, O.
Bausman Mfg. Co., Millersville, Pa.
Logan Co., Louisville, Ky.
Fred J. Meyers Mfg. Co., Hamilton, O.

PAVEMENT BREAKERS (See Breakers)

PAVING AND ROAD ROLLERS. (See Road and Paving Rollers)

PAVING BLOCKS, CREOSOTED WOOD. (See "Creosoted Blocks")

PAVING BRICK
Alton Brick Co., Alton, Ill.
Buckeye Shale Brick Co., Cleveland, O.
Buffalo Brick Co., Buffalo, Kans.
Cleveland Brick & Clay Co., Cleveland, O.
Collinwood Shale Brick Co., Cleveland, O.
Corry Brick & Tile Corp., Corry, Pa.
Crescent Brick Co., Pittsburgh, Pa.
Georgia Vit. Brick Co., Augusta, Ga.
Globe Brick Co., E. Liverpool, O.
Hammond Fire Brick Co., Fairmount, W. Va.
Hisylvania Coal Co., Columbus, O.
Hocking Val. Brick Co., Columbus, O.
McAvoy Vit. Brick Co., Phila., Pa.
Mayer Brick Co., Bridgeville, Pa.
Metropolis Pav. Br. Co., Pittsb'h, Kan.
Metropolitan Pav. Br. Co., Canton, O.
Mineral Wells Br. Co., Mineral Wells, Tex.
Moberly Pav. Br. Co., Moberly, Mo.
Murphysboro Pav. Brick Co., Murphysboro, Ill.
Nelsonville Brick Co., Nelsonville, O.
Patton Clay Mfg. Co., Patton, Pa.
Paxton Brick Co., Watsontown, Pa.
Peebles Pav. Br. Co., Portsmouth, O.
Peoria Brick & Tile Co., Peoria, Ill.
Purington Pav. Br. Co., Galesburg, Ill.
Rose Shale Brick Co., Veedersburg, Ind.
Russell Clay Mfg. Co., Alton, Ala.
So. Clay Mfg., Chattanooga, Tenn.
Spfld. Pav. Br. Co., Springfield, Ill.
Sterling Brick Co., Olean, N. Y.
Streator Clay Mfg. Co., Streator, Ill.
Terre Haute Vit. Brick Co., Terre Haute, Ind.
Thornton Fire Brick Co., Clarksburg, W. V.
Thurber Brick Co., Thurber, Tex.
Toronto Fire Clay Co., Toronto, O.
Trinidad Br. & Tile Co., Trinidad, O.
United Clay Prod. Corp., Kansas City
West'n Shale Prod. Co., Ft. Scott, Kan.
Westport Pav. Br. Co., Westport, Md.

PAVING MACHINERY (See Road and Paving Machinery)

PAVING GUARDS, STEEL
*W. S. Godwin Co., Baltimore, Md.

PAVING MATERIALS (See "Asphalt," "Paving Brick," "Granite Block," etc.)

PAVING MIXERS (See Concrete Mixers)

PAVING TOOLS
*Aeroil Burner Co., Union Hill, N. J.
*Barber Asphalt Co., Phila., Pa.
*Chausse Oil Burner Co., Elkhart, Ind.
*Connery & Co., Inc., Phila., Pa.
*Jos. Honhorst Co., Cincinnati, O.
*Littleford Bros. Co., Cincinnati, O.
*Union Iron Wks. Inc., Hoboken, N. J.
*Warren Bros. Co., Boston.
W. H. Anderson Tl. & Sup. Co., Detroit.
F. D. Cummer & Sons Co., Cleveland, O.

PERFORATED METALS
*Littleford Bros., Cincinnati
Allis-Chalmers Mfg. Co., Milwaukee.
Hendrick Mfg. Co., Carbondale, Pa.

PICKS
Beall Tool Co., E. Alton, Ill.
Hubbard Co., Pittsburgh, Pa.
Independent Pneum. Tool Co., Chicago
Iron City Tool Wks., Pittsburgh.
Klein-Logan Co., Pittsburgh.
Oliver Iron & Steel Co., Pittsburgh, Pa.
Verona Tool Wks., Verona, Pa.
Warren Tool & Forge Co., Warren, O.
Warwood Tool Co., Wheeling, W. Va.
Wyoming Shovel Wks., Wyoming, Pa.

PILE DRIVERS
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*McKiernan-Terry Drill Co., N. Y.
*Mead-Morrison Mfg. Co., B. Boston.
*Union Iron Wks., Inc., Hoboken, N. J
Industrial Wks., Bay City, Mich.
Lidgerwood Manufacturing Co., N. Y.
McMyler Interstate Co., Cleveland, O.

PILE HAMMERS, STEAM
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*McKiernan-Terry Drill Co., N. Y.
*Union Iron Wks., Inc., Hoboken, N. J.
Industrial Wks., Bay City, Mich.
Ntl. Hoisting Eng. Co., Harrison, N. J.
Vulcan Iron Wks., Chicago.

PILING, CONCRETE
MacArthur Conc. Pile & F'd'n Co., N.Y
Raymond Conc. Pile Co., N. Y.

PILING, INTERLOCKING STEEL
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., Pittsburgh, Pa.

PIPE, CAST IRON
*Central Fdry. Co., N. Y.
*U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Am. Cast Ir. Pipe Co., Birmingham, Ala.
J. B. Clow & Sons, Chicago.
Donaldson Iron Co., Emaus, Pa.
John Fox & Co., N. Y.
Glamorgan Pipe & Fdry. Co., Lynchburg, Va.
Lynchburg Fdry. Co., Lynchburg, Va.
McWane C. I. Pipe Co., Birmingham, Ala.
Nat. C. I. Pipe Co., Birmingham, Ala.
Warren Fdry. & Machine Co., N. Y.
R. D. Wood & Co, Phila., Pa.

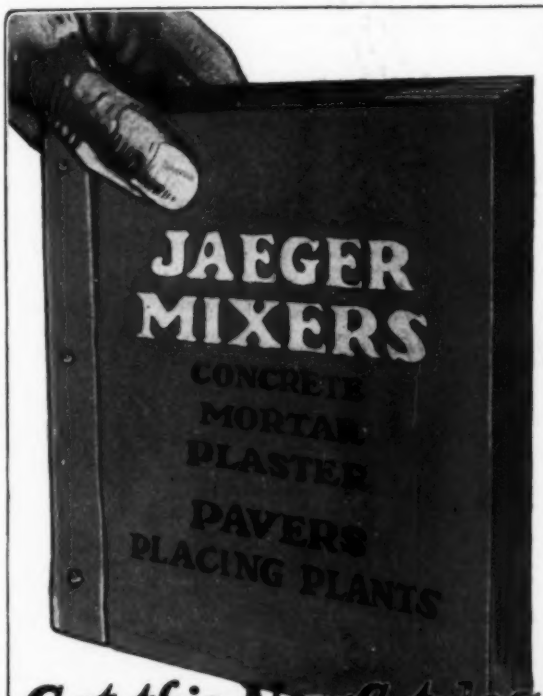
PIPE, CULVERT (See Culverts)

PIPE, LEAD
United Lead Company, N. Y.

PIPE, REINFORCED CONCRETE
*Newark Conc. Pipe Co., Newark, N. J.
Concrete Prod. Co., Pittsburgh, Pa.
Core Joint Conc. Pipe Co., Baltimore.
Independent Conc. Pipe Co., Indianapolis.
Lock Joint Pipe Co., E. Orange, N. J.
Massey Conc. Prod. Corp., Chicago.

PIPE, RIVETED STEEL OR IRON
*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Inc., Phila., Pa.
*Jos. Honhorst Co., Cincinnati, O.
*Littleford Bros., Cincinnati, O.
Abendroth & Root Mfg. Co., Newburg, N.Y.
American Spiral Pipe Wks., Chicago.
Canton Culvert & Silo Co., Canton, O.
Chatta. Boiler & Tk. Co., Chatta., Tenn.
Chicago Bridge & Ir. Wks., Chicago.
E. Jersey Pipe Co., N. Y.
Hammond Ir. Wks., Warren, Pa.
R. Hardesty Mfg. Co., Denver.

If you find any errors or omissions in this Where to Purchase list, please send corrections to
CONTRACTORS' & ENGINEERS' MONTHLY



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No more battering the bottom of loading skips or hoppers. This patented automatic attachment vibrates load out clean and fast. Another Jaeger success.

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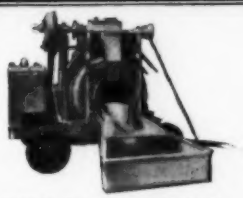
Cuts Mortar-Plaster Mixing Costs in Half

JAEGER *NON-TILT MIXER*



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At One Bag Weight and Price

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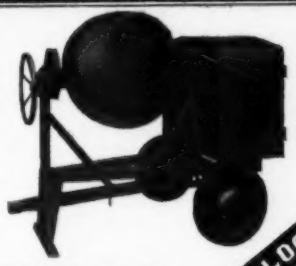
OVER 45000 IN USE



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Roller Bearings —
Cushion
Tires

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Add
City State

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Petroleum Ir. Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Tippet & Wood, Phillipsburg, N. J.
Weller Mfg. Co., Chicago.

PIPE, SPIRAL RIVETED
Abendroth & Root Mfg. Co., Newburg, N. Y.
American Spiral Pipe Wks., Chicago

PIPE, STEEL
Central Tube Co., Pittsburgh, Pa.
E. Jersey Pipe Co., N. Y.
Jones & Laughlin Stl. Co., Pittsburgh.
National Tube Co., Pittsburgh
Republic Ir. & Stl. Co., Youngstown, O.
South Chester Tube Co., Chester, Pa.
Spang-Chalfont & Co., Pittsburgh, Pa.
Wheeling Stl. Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

PIPE, WOOD
Amer. Wood Pipe Co., Tacoma, Wash.
Cascade Pipe & Flume Co., Seattle, Wash.
Federal Tank & Pipe Co., Seattle, Wash.
Mich. Pipe Co., Bay City, Mich.
Pacific Tank & Pipe Co., S. Francisco.
Redwood Mfrs. Co., S. Francisco.
Standard Wd. Pipe Co., Williamsport, Pa.
A. Wyckoff & Sons Co., Elmira, N. Y.

PIPE, WROUGHT IRON
A. M. Byers Co., Pittsburgh, Pa.
Reading Iron Co., Reading, Pa.

PIPE BENDING MACHINES
Am. Pipe Bending Mach. Co., Boston.
Walworth Mfg. Co., Boston.

PIPE COVERING

AIRCELL
*Philip Carey Co., Cincinnati, O.
Ehret Mag. Mfg. Co., Valley Forge, Pa.
Johns-Manville, Inc., N. Y.
Keasbey & Mattison Co., Ambler, Pa.
Ntl. Asbestos Co., Jersey City, N. J.
Norristown Mag. & Asb. Co., Norristown, Pa.
Sall Mountain Co., Chicago
H. F. Watson Co., Erie, Pa.

85 PER CENT MAGNESIA
*Philip Carey Co., Cincinnati, O.
Ehret Mag. Mfg. Co., Valley Forge, Pa.
Johns-Manville, Inc., N. Y.
Keasbey & Mattison Co., Ambler, Pa.

WOOD
Redwood Mfrs. Co., San Francisco.
Ric-WiL Co., Cleveland, O.
A. Wyckoff & Son Co., Elmira, N. Y.

PIPE CUTTERS (See Cutters, Pipe, Hand)

PIPE FITTINGS
*Central Fdry. Co., N. Y.
*U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
Amer. C. I. Pipe Co., Birmingham, Ala.
Builders Iron Fdry., Providence, R. I.
J. B. Clow & Sons, Chicago.
Crane Co., Chicago.
Donaldson Iron Co., Emaus, Pa.
Lunkenheimer Co., Cincinnati, O.
Ntl. C. I. Pipe Co., Birmingham, Ala.
Reading Stl. Casting Co., Inc., Bridgeport, Conn.
Warren Fdry. & Mach. Co., N. Y.
R. D. Wood & Co., Phila., Pa.

PIPE HANDLING MACHINERY
Mueller Company, Decatur, Ill.
Squier-Rix Co., Milwaukee.
Taylor Pert. Stl. Derrick Co., Chicago.

PIPE JOINT COMPOUND (Sewer)
*Philip Carey Co., Cincinnati, O.
*Pacific Flush Tank Co., Chi. and N. Y.
G. K. Sales Co., Macungie, Pa.
Leadite Company, Inc., Phila., Pa.
Ruberoid Co., N. Y.
Waring-Underwood Co., Phila., Pa.

PIPE JOINT MATERIAL (Cast Iron)
Hydraulic Development Co., Boston.
The Leadite Co., Phila., Pa.
United Lead Co., N. Y.

PLAYGROUND APPARATUS
American Playground Device Co., Anderson, Ind.
Chicago Gym. Equip. Co., Chicago.
Everwear Mfg. Co., Springfield, O.
Giant Mfg. Co., Council Bluffs, Ia.
Hill-Standard Co., Anderson, Ind.
Fred. Medart Mfg. Co., St. Louis, Mo.
Mitchell Mfg. Co., Milwaukee.
Patterson-Williams Co., San Jose, Cal.
A. G. Spalding & Bros., Chicopee, Mass.
F. B. Zieg Mfg. Co., Fredericktown, O.

PLOWS, CONTRACTORS'
*Austin-West'n Rd. Mach. Co., Chicago
*Burch Plow Wks. Co., Crestline, O.
*Caterpillar Trac. Co., San Leandro, Cal.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Roderick Lean Mfg. Co., Mansfield, O.
*Russell Grader Mfg. Co., Minneapolis.
*Wiard Plow Co., Batavia, N. Y.
J. D. Adams & Co., Ind'polis, Ind.
American Steel Scraper Co., Sidney, O.
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SEWAGE PUMPS (See Pumps)

SEWAGE EJECTORS
*Pacific Flush Tank Co., Chicago & N. Y.
Sanitation Corp., N. Y.
Simplex Ejector Co., Chicago.
Yeomans Bros. Co., Chicago.

SEWER BLOCKS, SEGMENT
American Vit. Products Co., Akron, O.
Cannelton Sewer Pipe Co., Cannelton, Ind.
Denver Sewer Pipe & Clay Co., Denver, Col.
W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
Evens & Howard Fire Brick Co., St. Louis, Mo.
Laclede Christy Clay Prod. Co., St. Louis, Mo.
Macomb Sewer Pipe Wks., Macomb, Ill.
Pacific Clay Prod. Co., L. Angeles, Cal.
Red Wing Sewer Pipe Co., Red Wing, Minn.
Robinson Clay Prod. Co., Akron, O.
Standard Fire Brick & Sewer Pipe Co., Pueblo, Col.

SEWER CLEANING APPARATUS
Atia Corp., New York
F. Bissell Co., Toledo, O.
Champion Corp., Hammond, Ind.
Self Propelling Nozzle Co., N. Y.
Turbine Sewer Mach. Co., Milwaukee.

SEWER PIPE AND DRAIN TILE
American Vit. Prod. Co., Akron, O.
Blackmer & Post Pipe Co., St. Louis
Wm. E. Dee Co., Chicago.
Denver Sewer Pipe & Clay Co., Denver, Col.
W. S. Dickey Clay Mfg. Co., K. City, Mo.
Logan Clay Prod. Co., Logan, O.
Ohio Vit. Pipe Co., Uhrichsville, O.
Robinson Clay Prod. Co., Akron, O.

SEWER PIPE FORMS
*Heltzel Stl. Form & Ir. Co., Warren, O.
Quinn Wire & Iron Wks., Boone, Ia.
Raber & Lang Mfg. Co., Kendallville, Ind.

SEWER PIPE JOINT COMPOUNDS
*Pacific Flush Tank Co., Chicago and N.Y.
G. K. Sales Agency, Macungie, Pa.
Ruberoid Co., N. Y.
Servicised Prod. Corp., Chicago

SEWER RODS
F. Bissell Co., Toledo, O.
Champion Corp., Hammond, Ind.
P. J. Healy, Jersey City, N. J.
Luck Sewer Equip. Co., Chicago
Turbine Sewer Mach. Co., Milwaukee

SHINGLES, METAL
Aluminum Co. of Am., Pittsburgh, Pa.
Berger Mfg. Co., Canton, O.
Canton Art Metal Co., Canton, O.
Edwards Mfg. Co., Cincinnati, O.
Klauer Mfg. Co., Dubuque, Ia.
Milwaukee Corrugating Co., Milwaukee.
Nat'l Sheet Metal Roofing Co., Jersey City, N. J.
Newport Rolling Mill Co., Newport, Ky.

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Telfax Tape Marked
Factory Certified

is standard equipment on

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WILLIAMSPORT WIRE ROPE COMPANY

Main Office and Works
Williamsport, Penna.

Peoples Gas Bldg., Chicago
General Sales Offices

Where to Purchase

Penn Metal Co., Boston.
Tiffin Art Metal Co., Tiffin, O.
Wheeling Metal Mfg. Co., Wheeling, W. Va.

SHORES
*M. & M. Wire Clamp Co., Minneapolis
Dayton Sure Grip & Shore Co., Dayton, O.
The O. D. G. Co., Owensboro, Ky.
H. W. Roos Co., Cincinnati, O.
Roos-Meyer-Hecht Co., Cincinnati, O.
Symons Clamp & Mfg. Co., Chicago.
Universal Form Clamp Co., Chicago.

SHOVELS, ELECTRIC
*Bay City Dredge Wks., Bay City, Mich.
*Byers Mach. Co., Ravenna, O.
*Koehring Co., Milwaukee, Wis.
*Thew Shovel Co., Lorain, O.
Bucyrus Co., So. Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Osgood Co., Marion, O.

SHOVELS, GASOLINE
*Bay City Dredge Wks., Bay City, Mich.
*Byers Mach. Co., Ravenna, O.
*Harnischfeger Corp., Milwaukee, Wis.
*Koehring Co., Milwaukee, Wis.
*Orton Crane & Shovel Co., Chicago
*Speeder Machy. Corp., Fairfield, Ia.
*Thew Shovel Co., Lorain, O.
*Universal Power Shovel Co., Detroit
Amer. Steel Dredge Co., Ft. Wayne, Ind.
Austin Mach. Corp., Muskegon, Mich.
Brown Hstg. Machy. Co., Cleveland, O.
Bucyrus Co., So. Milwaukee, Wis.
Erie Steam Shovel Co., Marion, O.
Marion Steam Shovel Co., Marion, O.
McMyler Interstate Co., Cleveland, O.
Osgood Co., Marion, O.

SHOVELS, HAND
American Mfg. Co., Chattanooga, Tenn.
Ames Shovel & Tool Co., Boston.
Beall Bros. Co., Altca, Ill.
Conneaut Shovel Co., Conneaut, O.
Hubbard & Co., Pittsburgh, Pa.
Indiana Shovel Co., New Castle, Ind.
Jackson Shovel Co., Montpelier, Ind.
Pittsburgh Shovel Co., Pittsburgh, Pa.
Russell Shovel Co., Aliquippa, Pa.
Stevens-Webb Co., Inc., Altoona, Pa.
Union Furnace Mfg. Co., Altoona, Pa.
Wood Shovel & Tool Co., Piqua, O.
Wyoming Shovel Wks., Wyoming, Pa.

SHOVELS, STEAM
*Erie Steam Shovel Co., Erie, Pa.
*Keystone Driller Co., Beaver Falls, Pa.
*Orton Crane & Shovel Co., Chicago
*Thew Shovel Co., Lorain, O.
Austin Mach. Corp., Muskegon, Mich.
Bellwood Stm. Shovel Co., Bellwood, Pa.
Bucyrus Co., So. Milwaukee, Wis.
Industrial Wks., Bay City, Mich.
Marion Steam Shovel Co., Marion, O.
Osgood Co., Marion, O.
Russell & Co., Massillon, O.

SIDEWALK AND ROAD FORMS (See "Forms, Concrete")

SIGNS, STREET AND ROAD
Auto Sign Display Co. of Mo., St. Louis, Mo.
Automatic Signal & Sign Co., Chicago.
Baltimore Enam. & Nov. Co., Baltimore.
Elkhart Fdry. & Mach. Co., Elkhart, Ind.
Evernu-Century Sign Co., Boston.
Ingram-Richardson Mfg. Co., Beaver Falls, Pa.
Lyle-Signs, Minneapolis, Minn.
Municipal Street Sign Co., N. Y.
Rochester St. Signal Co., Rochester, N.Y.
Standard Mfg Co., Cedar Falls, Ia.
Union Iron Prod. Co., E. Chicago, Ind.
Western Stamping & Mfg. Co., St. Paul

SIGNS, TRAFFIC
*Highway Trailer Co., Edgerton, Wis.
Acme Traffic Signal Co., Los Angeles.
Auto Sign Display Co. of Mo., St. Louis, Mo.
Automatic Signal & Sign Co., Chicago.
Automatic Signal & Sign Co., Canton, O.
Amer. Gas Accumulator Co., Elizabeth, N. J.
Crouse-Hinds Co., Syracuse, N. Y.
Elkhart Fdry. & Mach. Co., Elkhart, Ind.
Essco Mfg. Co., Peoria, Ill.
Evernu-Century Sign Co., Boston.
Griswold Safety Signal Co., Minneapolis.
Horni Signal Mfg. Corp., Newark, N. J.
Line Material Co., So. Milwaukee, Wis.
Little Giant Co., Mankato, Minn.
Lyle-Signs, Minneapolis, Minn.
Ohio Traffic Devices Co., Columbus, O.
Rochester St. Signal Co., Rochester, N.Y.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
Union Iron Prod. Co., E. Chicago, Ind.
Universal Traffic Control Co., Oklahoma City, Okla.

SLEEVES, TAPPING AND VALVE
Mueller Company, Decatur, Ill.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., East Orange, N. J.

SLUICE GATES (See Gates, Sluice)

SMOKE STACKS (See Stacks, Steel)

SNOW CLEANING MACHINERY
*Austin-Western Rd. Machy. Co., Chicago.
*Baker Mfg. Co., Springfield, Ill.
*Barber-Greene Co., Aurora, Ill.
*Byers Mach. Co., Ravenna, O.
*Caterpillar Tractor Co., San Leandro, Calif. and Peoria, Ill.
*Cleveland Tractor Co., Cleveland, O.
*Galion Iron Wks. & Mfg. Co., Galion, O.
*Good Rds. Mach. Co., Kennett Sq., Pa.
*La Plant-Choate Mfg. Co., Cedar Rapids, Ia.
*Mack Trucks, Inc., N. Y.
*Mead-Morrison Mfg. Co., E. Boston.
*Russell Grader Mfg. Co., Minneapolis.
*Shaw-Enochs Tractor Co., Minneapolis
C. D. Edwards Mfg. Co., Albert Lea, Minn.
Hiway Service Corp., Wasau, Wis.
Killefer Mfg. Co., Los Angeles, Cal.
Linn Mfg. Co., Morris, N. Y.
Monarch Tractors Corp., Springfield, Ill.
Owensboro Ditcher & Grader Co., Owensboro, Ky.
Rotary Snow Plow Co., Minneapolis.
W. M. Toy Co., Sidney, O.
Union Iron Wks., Inc., Bangor, Me.
Walshs Holyoke St. Bir. Wks., Holyoke, Mass.

SNOW FENCING (See Fencing)

SPADES (See Shovels)

SPRAYERS, ASPHALT AND TAR
*Littleford Bros., Cincinnati
Kinney Mfg. Co., Boston

SPRAYING MACHINERY FOR TREES
Bean Spray Pump Co., Lansing, Mich.
Field Force Pump Co., Elmira, N. Y.
Fitzhenry-Guptill Co., E. Cambridge, Mass.

SPREADERS, STONE
*Austin-Western Rd. Mchy. Co., Chicago.
*Burch Plow Wks. Co., Crestline, O.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Shaw-Enochs Tractor Co., Minneapolis

STACKS, STEEL
*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Inc., Philadelphia.
*Heil Co., Milwaukee, Wis.
*Jos. Honhorst Co., Cincinnati, O.
*Littleford Bros., Cincinnati, O.
*N. Y. Central Iron Wks. Co., Inc., Hagerstown, Md.
Birmingham Tank Co., Birmingham, Ala.
Chatta. Boiler & Tank Co., Chatta., Tenn.
Chicago Bridge & Iron Wks., Chicago.
Graver Corp., Chicago
Petroleum Iron Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
W. B. Scaife & Sons Co., Pittsburgh, Pa.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

STANDPIPES, TANKS AND TOWERS
W. E. Caldwell Co., Louisville, Ky.
Chatta. Blr. & Tank Co., Chatta, Tenn.
Chicago Bridge & Ir. Wks., Chicago
Lancaster Iron Wks., Lancaster, Pa.
Pacific Tank & Pipe Co., San Francisco.
Petroleum Ir. Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
United Iron Wks., Inc., K. City, Mo.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.

STEAM SHOVELS (See Shovels, Steam)

STEAM TURBINES (See Turbines)

STEEL PLATE CONSTRUCTION
*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Philadelphia.
*Heil Co., Milwaukee, Wis.
*Heltzel St. Form & Ir. Co., Warren, O.
*Jos. Honhort Co., Cincinnati, O.
*Littleford Bros., Cincinnati, O.
*N. Y. Central Iron Wks. Co., Inc., Hagerstown, Md.
*Union Iron Wks., Inc., Hoboken, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Bigga Boiler Wks., Akron, O.
Birmingham Tank Co., Birmingham, Ala.
Chatta. Boiler & Tank Co., Chatta., Tenn.
Chicago Bridge & Iron Wks., Chicago.
Graver Corp., E. Chicago, Ind.
Hendrick Mfg. Co., Carbondale, Pa.
McClintic-Marshall Co., Pittsburgh, Pa.
Penna. Bridge Co., Beaver Falls, Pa.
Petroleum Iron Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Riter-Conley Co., Pittsburgh, Pa.
W. B. Scaife & Sons, Pittsburgh, Pa.
Toledo Crane Co., Toledo, O.
Walsh & Weidner Blr. Co., Chatta., Tenn.

STOKERS, MECHANICAL
Automatic Furnace Co., Dayton, O.
Babcock & Wilcox Co., N. Y.
Combustion Engineering Corp., N. Y.
Detroit Stoker Co., Detroit.
Sanford Riley Stoker Co., Worcester, Mass.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

STREET AND ROAD SIGNS (See Signs)

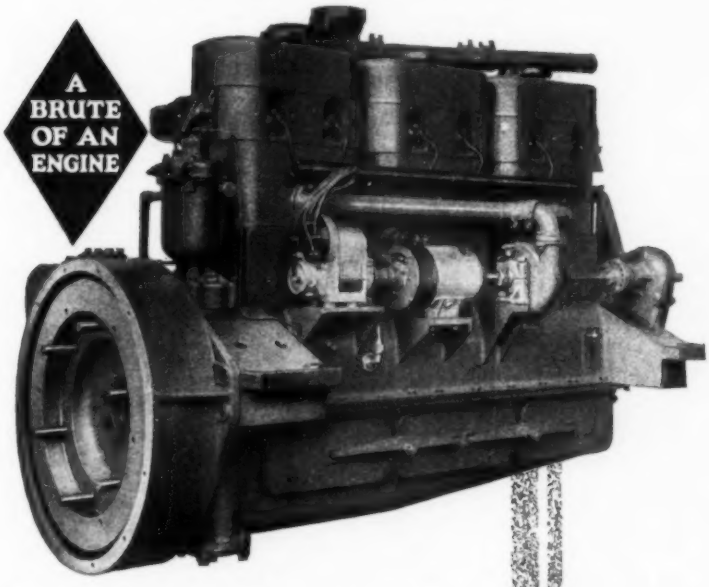
STREET CLEANERS CARTS
Durlach Can & Iron Wks., B'lyn, N. Y.
Rochester Can Co., Rochester, N. Y.
Tarrant Mfg. Co., Saratoga Springs, N.Y.

STREET FLUSHERS AND SPRINKLERS
*Austin-Western Rd. Mchy. Co., Chicago.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Heil Co., Milwaukee, Wis.
*Kinney Mfg. Co., Boston
*Mack Trucks, Inc., N. Y.
Autocar Co., Ardmore, Pa.
E. D. Etnyre & Co., Oregon, Ill.
Federal Motor Truck Co., Detroit.
Chas. Hvass & Co., N. Y.
Municipal Supply Co., So. Bend, Ind.
White Co., Cleveland, O
Yellow Truck & Coach Mfg. Co., Chicago

STREET LAMP POSTS
*Novo Engine Co., Lansing, Mich.

If you find any errors or omissions in this Where to Purchase list, please send corrections to
CONTRACTORS' & ENGINEERS' MONTHLY

A BRUTE OF AN ENGINE



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Naturally Beaver power means more yardage and more years of equipment life. Its unusually large working parts and force-feed lubricating system, which is fool-proof and trustworthy, give it greater ruggedness, strength and endurance.

There's no choosing of work in the field. Get the power that is impartial and equal to all work. Whether the equipment needs 25 or 150 H. P., the Beaver assures the same smoothness and flexibility of power, chiefly because of its freedom from vibration.

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American Cons. Prod. Co., Chicago.
Chicago Cons. Post Co., Chicago.
J. B. Clow & Sons, Chicago.
Electric Ry. Equip. Co., Cincinnati, O.
King Mfg. Co., Chicago.
Union Metal Mfg. Co., Canton, O.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

STREET SIGNS (See Signs, Street)

STREET SWEEPERS
*Austin-Western Rd. Mchy. Co., Chicago.
*Good Rds. Mach. Co., Kennett Sq., Pa.
*Kinney Mfg. Co., Boston
Butler Mfg. Co., Cleveland, O.
Elgin Sales Corp., N. Y.
Foamite-Childs Corp., Utica, N. Y.

STREET SWEEPING BROOMS
*Littleford Bros., Cincinnati, O.
J. I. Holcomb Mfg. Co., Indianapolis.
Ind. Brush & Broom Mfg. Co., Indianapolis, Ind.
Kendallville Broom & Brush Co., Kendallville, Ind.
Lang Broom Co., Pittsburgh, Pa.
Jos. Lay Co., Ridgeville, Ind.
Milwaukee Brush Mfg. Co., Milwaukee.
Osborn Mfg. Co., Cleveland, O.

STREET SWEEPING BROOMS REFILLED
Kendallville Broom & Brush Co., Kendallville, Ind.
Lang Broom Co., Pittsburgh, Pa.
Osborn Mfg. Co., Cleveland, O.

STUMP PULLERS
*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*La Plant-Choate Mfg. Co., Cedar Rapids, Ia.
Ersted Machy. Mfg. Co., Portland, Ore.
H. L. Bennett & Co., Westerville, O.
Thomas Elevator Co., Chicago.
John Waldron Corp., New Brunswick, N. J.

SUBGRADING MACHINES
*Lakewood Eng. Co., Cleveland, O.
*Shaw-Enochs Tractor Co., Minneapolis
The Hug Co., Highland, Ill.

SUPERHEATERS
Babcock & Wilcox Co., N. Y.
Power Specialty Co., N. Y.
Superheater Co., N. Y.

SURVEYORS' INSTRUMENTS (See Instruments)

SWITCHBOARDS
Allis-Chalmers Mfg. Co., Milwaukee.
General Elec. Co., Schenectady, N. Y.
Wagner Elec. Mfg Co., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

TAMPING MACHINES
*Harnischfeger Corp., Milwaukee, Wis.
*Ingersoll-Rand Co., N. Y.
Chicago Pneum. Tool Co., New York

TANKS, AIR COMPRESSOR
*Connery & Co., Inc., Philadelphia.
*Curtis Pneum. Mchy. Co., St. Louis, Mo.
*Heil Co., Milwaukee, Wis.
*Ingersoll-Rand Co., N. Y.
*Littleford Bros., Cincinnati, O.
Abendroth & Root Mfg. Co., N. Y.
Biggs Boiler Wks., Akron, O.
Birmingham Tank Co., Birmingham, Ala.
Chicago Bridge & Iron Wks., Chicago.
Chicago Pneum. Tool Co., N. Y.
Graver Corp., E. Chicago, Ind.
Independent Pneum. Tool Co., Chicago
Indiana Air Pump Co., Indianapolis.
Lancaster Iron Wks., Lancaster, Pa.
National Tube Co., Pittsburgh, Pa.
Petroleum Iron Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
W. B. Scaife & Sons Co., Pittsburgh, Pa.
Westinghouse Tract. Brake Co., Wilmerding, Pa.
Worthington Pump & Machy. Corp., N.Y.

TANKS, STEEL
*Connery & Co., Philadelphia.
*Heil Co., Milwaukee, Wis.
*Jos. Honhorst Co., Cincinnati, O.
*Littleford Bros., Cincinnati, O.
*N. Y. Central Irn. Wks. Co., Hagerstown, Md.
Biggs Boiler Wks., Akron, O.
Birmingham Tank Co., Birmingham, Ala.
S. F. Bowser & Co., Inc., Ft. Wayne, Ind
J. I. Case Threshing Mach. Co., Racine, Wis.
W. E. Caldwell Co., Louisville, Ky.
Chatta. Boiler & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Wks., Chicago.
Columbian St. Tank Co., K. City, Mo.
Dover Boiler Wks., N. Y.
Farrell Mfg. Co., Joliet, Ill.
C. C. Fouts Co., Middletown, O.
Graver Corp., E. Chicago, Ind.
R. Hardesty Mfg. Co., Denver, Col.
Hendrick Mfg. Co., Carbondale, Pa.
Lancaster Iron Wks., Lancaster, Pa.
Pacific Tank & Pipe Co., San Francisco.
Petroleum Iron Wks. Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Riter-Conley Co., Pittsburgh, Pa.
W. B. Scaife & Sons, Oakmont, Pa.
United Iron Wks., Inc., K. City, Mo.
Walsh & Weidner Boiler Co., Chattanooga, Tenn.
Wayne Tank & Pump Co., Ft. Wayne, Ind

TANKS, WOOD
W. E. Caldwell Co., Louisville, Ky.
G. M. Davis & Son, Palatka, Fla.
Eagle Tank Co., Chicago.
Hauser-Stander Tank Co., Cincinnati, O.
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
Nat'l Tank & Pipe Co., Portland, Ore.
Pacific Tank & Pipe Co., San Francisco.
Redwood Mfrs. Co., San Francisco.
A. T. Stearns Lumber Co., Boston.
U. S. Wind Eng. & Pump Co., Batavia, Ill.
Wendnagel & Co., Chicago.

TANK WAGONS
*Acme Rd. Mach. Co., Frankfort, N. Y.
*Galion Ir. Wks. & Mfg. Co., Galion, O.
*Heil Co., Milwaukee, Wis.
*Jos. Honhorst Co., Cincinnati, O.
*Mack Trucks, Inc., N. Y.
Butler Mfg. Co., Minneapolis, Minn.
J. I. Case Threshing Mach. Co., Racine, Wis.

TAPES, STEEL AND METALLIC
*Lufkin Rule Co., Saginaw, Mich.
Eugene Dietzgen Co., N. Y.
Keuffel & Esser Co., Hoboken, N. J.
The L. S. Starrett Co., Athol, Mass.

TAR
*Barrett Co., N. Y.
Amer. Tar Prod. Co., Pittsburgh, Pa.

TAR KETTLES (See Kettles)

THAWING OUTFITS
*Aeroil Burner Co., Union Hill, N. J.
*Hauck Mfg. Co., Bklyn. N. Y.
*Littleford Bros., Cincinnati

TIE TAMPERS
Electric Tamper & Equip. Co., Chicago

TIE BOLTS FOR WALL FORMS
*Hawley Tie Bolt Co., Minneapolis

TIES, STEEL
*Koppel Ind. Car & Equip. Co., Koppel, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Int'l Steel Tie Co., Cleveland, O.
Sweet's Steel Co., Williamsport, Pa.

TIMBER CLAMPS
Pyle-Rogers Corp., N. Y.

TIRES, RUBBER (For Motor Trucks)
Firestone Tire & Rubber Co., Akron, O.
Fisk Tire Co., Chicopee Falls, Mass.
Goodrich Rubber Co., Akron, O.
Goodyear Tire & Rubber Co., Akron, O.
Kelly Springfield Tire Co., N. Y.
U. S. Tire Co., N. Y.

TOOL HOUSES, PORTABLE STEEL
*Blaw-Knox Co., Pittsburgh, Pa.
*Littleford Bros., Cincinnati, O.

TORCHES, OIL (HEATING)
*Chausse Oil Burner Co., Elkhart, Ind.
*Hauck Mfg. Co., Bklyn, N. Y.
*Littleford Bros., Cincinnati
*Mead-Morrison Mfg. Co., E. Boston.
*Alex. Milburn Co., Baltimore, Md.

TOWERS (See Standpipe, Tanks and Towers)

TRACKS, INDUSTRIAL AND PORTABLE
*Easton Car & Constn. Co., Easton, Pa.
*Lakewood Eng. Co., Cleveland, O.
*Koppel Ind. Car & Equip. Co., Koppel, Pa.
Atlas Car & Mfg. Co., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Fdry. & Mfg. Co., Columbus, O.
C. W. Hunt Co., Inc., W.N.Brighton, N.Y.
Sweet's Steel Co., Williamsport, Pa.

TRACTORS
*Bates Mfg. Co., Joliet, Ill.
*Caterpillar Tractor Co., San Leandro, Calif.
*Cleveland Tractor Co., Cleveland, O.
*Ford Motor Co., Detroit, Mich.
*Geo. Haiss Mfg. Co., New York
*Huber Mfg. Co., Marion, O.
*J. T. Tractor Co., Cleveland, O.
*John Lauson Co., New Holstein, Wis.
*Mack Trucks, Inc., N. Y.
*Mead-Morrison Mfg. Co., E. Boston.
*Rogers Bros. Corp., Albion, Pa.
*Shaw-Enochs Tractor Co., Minneapolis
Advance-Rumely Thresher Co., Laporte Ind.
Allis-Chalmers Mfg. Co., Milwaukee
Clark Tructractor Co., Buchanan, Mich
Emerson-Brantingham, Rockford, Ill.
Hart-Parr Co., Charles City, Ia.
Int'l Harvester Co., Chicago.
Kinnard & Haines, Minneapolis, Minn
Minneapolis Steel & Mach. Co., Minneapolis
Monarch Tractors Corp., Springfield, Ill.

TRAFFIC LINE MARKERS
Continental Prod. Co., Euclid, O.
Line-O-Graph Co., N. Y.
Tenn. Tool Wks., Inc., Knoxville, Tenn.

TRAFFIC PAINT
J. E. Bauer Co., Los Angeles, Cal.
Continental Prod. Co., Euclid, O.
Hanline Bros., Baltimore, Md.
Hoosier Paint Wks., Ft. Wayne, Ind.
Sewall Paint & Varnish Co., K. City, Mo.
Sherwin-Williams Co., Cleveland, O.
Tropical Paint & Oil Co., Cleveland, O.
Truscon Laboratories, Detroit, Mich
Wamblu Paint & Varnish Works, Rochester, N. Y.

TRAFFIC SIGNS (See "Signs, Traffic")

TRAILERS FOR TRUCKS AND TRACTORS
*Eagle Wagon Wks., Auburn, N. Y.
*Easton Car & Const'n Co., Easton, Pa.
*La Plant-Choate Mfg. Co., Cedar Rapids, Ia.
*Highway Trailer Co., Edgerton, Wis.
*Miami Trailer-Scraper Co., Troy, O.
*Rex-Watson Corp., Canastota, N. Y.
*Rogers Bros. Corp., Albion, Pa.
Arcadia Trailer Corp., Newark, N. Y.
Detroit Trailer & Mach. Co., Detroit.
Freuhauf Trailer Co., Detroit, Mich.
Hercules Trailer Mfg. Co., Los Angeles
Lee Trailer & Body Co., Chicago.
Squier-Rix Co., Milwaukee, Wis.
Trailmobile Co., Cincinnati
Troy Wagon Wks., Troy, O.
Warner Mfg. Co., Beloit, Wis.
Whitehead & Kales Co., Detroit, Mich.

TRAILERS, INDUSTRIAL
*Easton Car & Const'n Co., Easton, Pa.
*Highway Trailer Co., Edgerton, Wis.
*Lakewood Eng. Co., Cleveland, O.

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The Buckeye Utility Backfiller has proved itself under widely varied conditions, and in a wide variety of uses. It has fully measured up to the standards Buckeye has maintained for over thirty years. Today it is standard equipment, filling a need no other machine has filled.

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No Buckeye equipment is ever so perfect that Buckeye does not constantly strive to improve it. The Buckeye Utility Backfiller of 1927 shows the results. Even more simple, even more rugged and compact than before, it now has even greater stamina and range of usefulness.

BUCKEYE Model O UTILITY BACKFILLER

With full-circle swing and adjustable-length boom

Primarily a backfiller, it may also be used as a dragline. It is a perfected light crane. Equipped with a clamshell, it handles all loose material and helps you clean up after excavation jobs.

Convenient one-man control, and a boom adjustable from 21 ft. to 33 ft., help adapt this Buckeye to this wide variety of work.

Write for detailed information.

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FINDLAY, OHIO

Manufacturers of Trench Excavators (both Wheel and Chain-and-Bucket Types), Pipe Line Trench Excavators, Tile and Open Ditchers, Back Fillers, Pipe Screwing Machines, Curb Diggers and Clay Diggers.

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BUILDERS OF TRENCH EXCAVATORS FOR OVER 30 YEARS

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*La Plant Choate Mfg. Co., Cedar Rapids, Ia.
Chase Fdry. & Mfg. Co., Columbus, O.
Detroit Trailer & Mach. Co., Detroit.
Electric Wheel Co., Quincy, Ill.
Lee Trailer & Body Co., Chicago.
Trailmobile Co., Cincinnati
Whitehead & Kales, Detroit, Mich.

TRAMWAYS, AERIAL WIRE ROPE
(See Aerial Wire Rope Tramways)

TRANSFORMERS
Allis-Chalmers Mfg. Co., Milwaukee.
Duncan Elec. Mfg. Co., Lafayette, Ind.
Enterprise Elec. Co., Warren, O.
General Elec. Co., Schenectady, N. Y.
Kuhlman Elec. Co., Bay City, Mich.
Maloney Elec. Co., St. Louis, Mo.
Packard Elec. Co., Warren, O.
Pittsburgh Transf. Co., Pittsburgh, Pa.
Wagner Elec. Corp., St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

TRANSITS AND LEVELS (See Instruments)

TRANSMISSION (Auxiliary for Fords)
*Fuller & Sons Mfg. Co., Kalamazoo, Mich.
Hinkley Motors, Inc., Detroit
Lincoln Mfg. Co., Connersville, Ind.
Ruckstell Sales & Mfg. Co., N. Y.
Warford Corpn., N. Y.

TRANSMISSION MACHINERY, POWER
*Chain Belt Co., Milwaukee, Wis.
*Link-Belt Co., Chicago
Allis-Chalmers Mfg. Co., Milwaukee.
Dodge Mfg. Corpn., Mishawaka, Ind.
Webster Mfg. Co., Chicago.
Weller Mfg. Co., Chicago.

TRASH CANS (See Cans)

TREADS, SAFETY
Amer. Abrasive Metals Co., N. Y.
Amer. Mason Safety Tread Co., Lowell, Mass.
Concrete Steel Co., N. Y.
Norton Co., Worcester, Mass.

TRENCH EXCAVATORS (See Excavators)

TRENCH PUMPS (See Pumps, Contractors')

TURBINES
*Ingersoll-Rand Co., N. Y.
Allis-Chalmers Mfg. Co., Milwaukee.
De Laval Steam Turbine Co., Trenton, N. J.
General Elec. Co., Schenectady, N. Y.
Terry Steam Turb. Co., Hartford, Ct.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

TURNTABLES FOR MOTOR TRUCKS
*Blaw-Knox Co., Pittsburgh, Pa.
*Easton Car & Const. Co., Easton, Pa.
Champion Eng. Co., Kenton, O.
Freeman Mfg. Co., Racine, Wis.
Hug Co., Highland, Ill.
Western Structural Co., Moline, Ill.

VALVES, ACID RESISTING
*Barber Asphalt Co., Philadelphia

VALVES, CHECK
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston.
Ludlow Valve Mfg. Co., Troy, N. Y.
Mich. Valve & Fdry. Co., Detroit.
Rensselaer Valve Co., Troy, N. Y.

VALVES, GATE AND INDICATOR POSTS
Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston.
Columbian Ir. Wks., Chattanooga, Tenn.
Crane Company, Chicago.
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve Co., Waterford, N. Y.
Fairbanks Co., N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N.J.
R. D. Wood & Co., Philadelphia.

VALVES, PRESSURE SEATED
Cleveland Pneum. Tool Co., Cleveland, Ohio.

VALVES, TAPPING
Eddy Valve Co., Waterford, N. Y.
Hays Mfg. Co., Erie, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Co., Troy, N. Y.
Michigan Valve & Fdry. Co., Detroit
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.

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*U. S. Cast Iron Pipe & Fdry. Co., Burlington, N. J.
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H. W. Clark Co., Mattoon, Ill.
J. B. Clow & Sons, Chicago.
Columbian Ir. Wks., Chattanooga, Tenn.
Darling Valve & Mfg. Co., W'msport, Pa.
Eddy Valve Co., Waterford, N. Y.
Fairbanks Co., N. Y.
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Ludlow Valve Mfg. Co., Troy, N. Y.
H. Mueller Mfg. Co., Decatur, Ill.
Rensselaer Valve Co., Troy, N. Y.
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R. D. Wood & Co., Philadelphia

WAGONS (See Dump Carts and Wagons)

WAGON BODIES (See Dump Bodies)

WAGON LOADERS (See Loaders, Gravel and Wagon)

WALLBOARD
Beaver Prod. Co., Inc., Buffalo, N. Y.
Bird & Son, Inc., E. Walpole, Mass.
Cornell Wood Prod. Co., Chicago.
Haverhill Box Board Co., Haverhill, Mass.
MacAndrews & Forbes Co., N. Y.
Plastergon Wall Board Co., Buffalo, N.Y.
U. S. Gypsum Co., Chicago.
Upson Co., Lockport, N. Y.
Waldorf Paper Prod. Co., St. Paul, Minn

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Concrete Steel Co., N. Y.
Consolidated Exp. Metal Co., Wheeling, W. Va.
Berger Mfg. Co., Canton, O.
Milwaukee Corr. Co., Milwaukee, Wis.
Niagara Metal Stamp. Corp., Niagara Falls, N. Y.

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Nat'l Water Main Cleaning Co., N. Y.

WATER MAIN TAPPING MACHINES
Hays Mfg. Co., Erie, Pa.
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A. P. Smith Mfg. Co., E. Orange, N. J.

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*Barber Asphalt Co., Philadelphia.
*Barrett Company, N. Y.
*Philip Carey Co., Cincinnati, O.
*Standard Oil Co. (Indiana), Chicago
Atlantic Refining & Asphalt Corp., Phil'a
General Firep'f'g Co., Youngstown, O.
Master Builders' Co., Cleveland, O.
Minwax Co., N. Y.
Protexol Corpn., N. Y.
Ruberoid Co., N. Y.
Sandusky Cement Co., Cleveland, O.
Sonneborn Sons, Inc., N. Y.
Texas Company, N. Y.
Toch Brothers, N. Y.
Truscon Laboratories, Detroit, Mich.

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*Wallace & Tiernan Co., Inc., Newark, N.J.
Paradon Eng. Co., L. I. City, N. Y.
R. U. V. Co., N. Y.

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Arnold Hoffman & Co., Inc., N. Y.
E. I. Du Pont de Nemours & Co., Wilmington, Del.
Electro Bleaching Gas Co., N. Y.
General Chemical Co., N. Y.
Hooker Electrochemical Co., N. Y.
Mathieson Alkali Works, Inc., N. Y.
Penna. Salt Mfg. Co., Philadelphia

WATER SOFTENERS
Amer. Water Softener Co., Philadelphia.
Cochrane Corp., Philadelphia.
Graver Corp., E. Chicago, Ind.
Int'l Filter Co., Chicago.
Permutit Co., N. Y.
W. B. Scaife & Sons, Pittsburgh, Pa.
Wayne Tank & Pump Co., Ft. Wayne, Ind.

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Pitometer Co., N. Y.
Simplex Valve & Meter Co., Phil'a.

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J. Leffel & Co., Springfield, O.
Newport News Shipbldg. & Dry Dock Co., Newport News, Va.
Pelton Water Wheel Co., San Francisco.
S. Morgan Smith Co., York, Pa.
Worthington Pump & Mchy. Corp., N.Y.

WATER WORKS PUMPS (See Pumps)

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*Alex. Milburn Co., Baltimore, Md.
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Lincoln Elec. Co., Cleveland, O.
Oxweld Acetylene Co., L. I. City, N. Y.
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Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

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Kelly Well Co., Grand Island, Neb.

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*Keystone Driller Co., Beaver Falls, Pa.
Armstrong Mfg. Co., Waterloo, Ia.
Loomis Mach. Co., Tiffin, O.
Sanderson Cyclone Drill Co., Orrville, O
Star Drilling Mach. Co., Akron, O.

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*Jackson Mfg. Co., Harrisburg, Pa.
*Lansing Co., Lansing, Mich.
*Sterling Wheelbarrow Co., Milwaukee
*Toledo Wheelbarrow Co., Toledo, O.
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Cleveland Wheelbarrow Co., Cleveland, O.
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Puffer-Hubbard Mfg. Co., Minneapolis.
Sidney Steel Scraper Co., Sidney, O.

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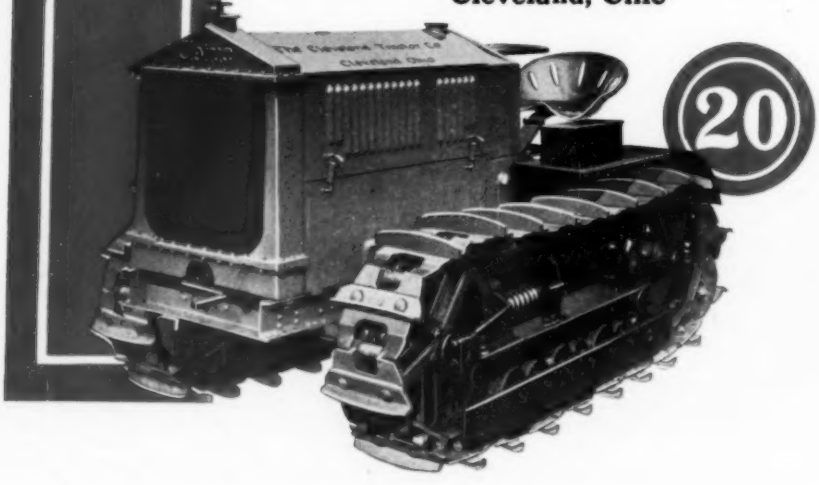
POWER—in proportion to weight—in a degree never before attained in the history of tractor engineering!

Cletracs deliver more of the motor's power at the drawbar than any other tractors built. No other tractors are as accessible or have such a small frictional loss of power. No other tractors steer so easily or ride so comfortably. No other tractors can be operated so economically from an upkeep standpoint. Big claims—***but they don't tell half the story!***

The Cletrac owner has the advantage of higher speed. He has a tractor which makes real "one-man outfits" out of equipment that, with other tractors, requires two men to operate. Here is a tractor that works perfectly over any footing, which does more kinds of work more days in the year and which can be operated at lowest possible cost when figured "per mile, per hour, or per yard."

You will find more real power, better designing and finer materials at the Cletrac Booth than at any other place at the show!

The Cleveland Tractor Company
Cleveland, Ohio



CRAWLER TRACTORS

At the ROAD SHOW
CLETRAC Booth N-C 2

SEE THE 20-K. The latest and most advanced principles of design and construction known to tractor engineers are found in Cletrac Twenty-K Plain bearing lower track wheels requiring no adjustment. "Snap" one-shot lubrication. Easy handling—comfortable riding—unusual accessibility. And unequalled in its class in pounds pull delivered at the drawbar.

SEE THE 30-A. Equipped with a *six-cylinder motor*. The same advanced design and quality construction as found in Cletrac Twenty-K are used in Cletrac Thirty-A. This model is primarily adapted for the heavier jobs of road construction, highway maintenance and general industrial service.

Advance Announcement

The super-powered Cletrac "75" will be on exhibit at the Road Show, Chicago, January 10th to January 14th. This model will be ready for late spring delivery.

Arrived!
The Perf
THE GENERAL EXCAVATOR — The Master Tool for every Excavating Purpose. Twenty-years shovel design and manufacturing experience "in-built." Not an experiment. Not a "make-shift." Not an "accident" or an "after thought". Not built "around" another and different kind or size of machine. It is the worthy descendent of a long line of popular and successful Power Shovels. Full half-yard capacity — no "skimping." Simple. Powerful. Rugged. Mobile. 90% of its weight — 32,000 lbs. — is in alloy steel castings. Convertible in the field to Crane, Drag-Line, Ditcher, Trencher, Skimmer or Back-Filler. Uses either Electric Motor or Gasoline Engine delivering 45 Horse Power at 1,000 RPM. Has features not found in any other Excavating Machine.
THE GENERAL EXCAVATOR COMPANY
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THE GENERAL EXCAVATOR COMPANY
The Product of Specialists — Built

Visit Our Booth at Chicago Road Show, NCB-71, The Coliseum, January 10th-14th

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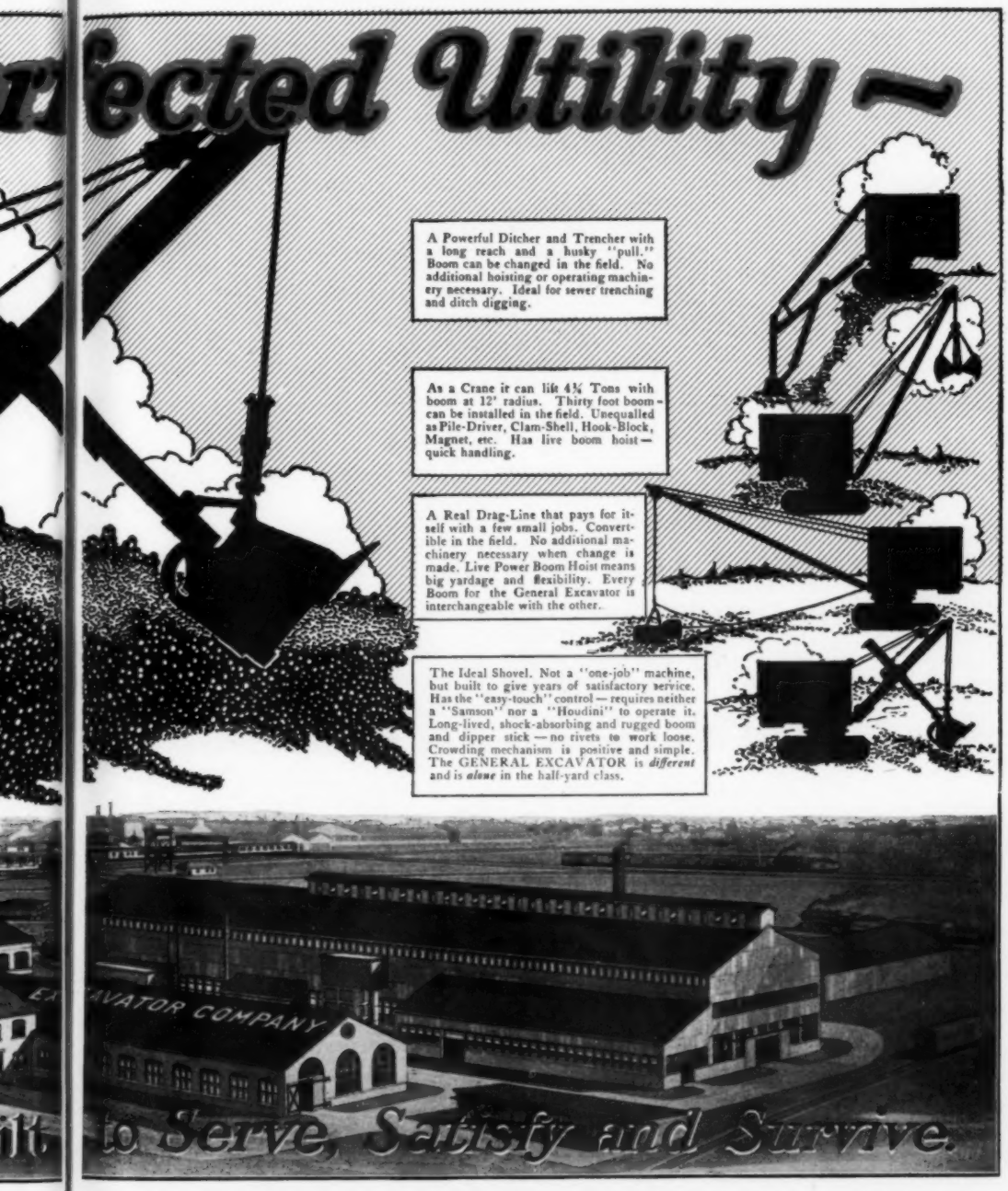
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A Powerful Ditcher and Trencher with a long reach and a husky "pull." Boom can be changed in the field. No additional hoisting or operating machinery necessary. Ideal for sewer trenching and ditch digging.
As a Crane it can lift 4¼ Tons with boom at 12' radius. Thirty foot boom can be installed in the field. Unequalled as Pile-Driver, Clam-Shell, Hook-Block, Magnet, etc. Has live boom hoist—quick handling.
A Real Drag-Line that pays for itself with a few small jobs. Convertible in the field. No additional machinery necessary when change is made. Live Power Boom Hoist means big yardage and flexibility. Every Boom for the General Excavator is interchangeable with the other.
The Ideal Shovel. Not a "one-job" machine, but built to give years of satisfactory service. Has the "easy-touch" control — requires neither a "Samson" nor a "Houdini" to operate it. Long-lived, shock-absorbing and rugged boom and dipper stick — no rivets to work loose. Crowding mechanism is positive and simple. The GENERAL EXCAVATOR is *different* and is *alone* in the half-yard class.
AVATOR COMPANY
to Serve, Satisfy and Survive.

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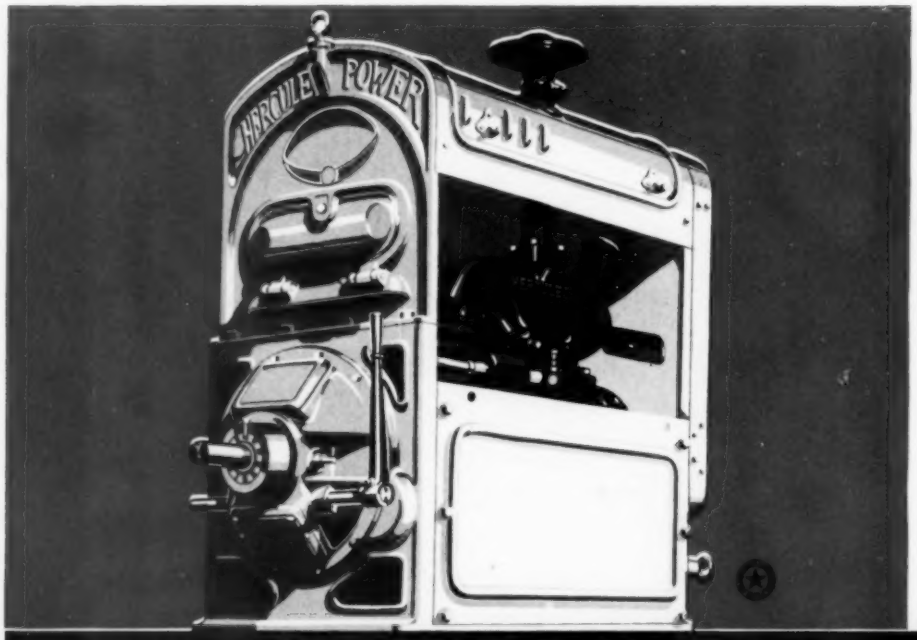

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CANTON, OHIO, U. S. A.

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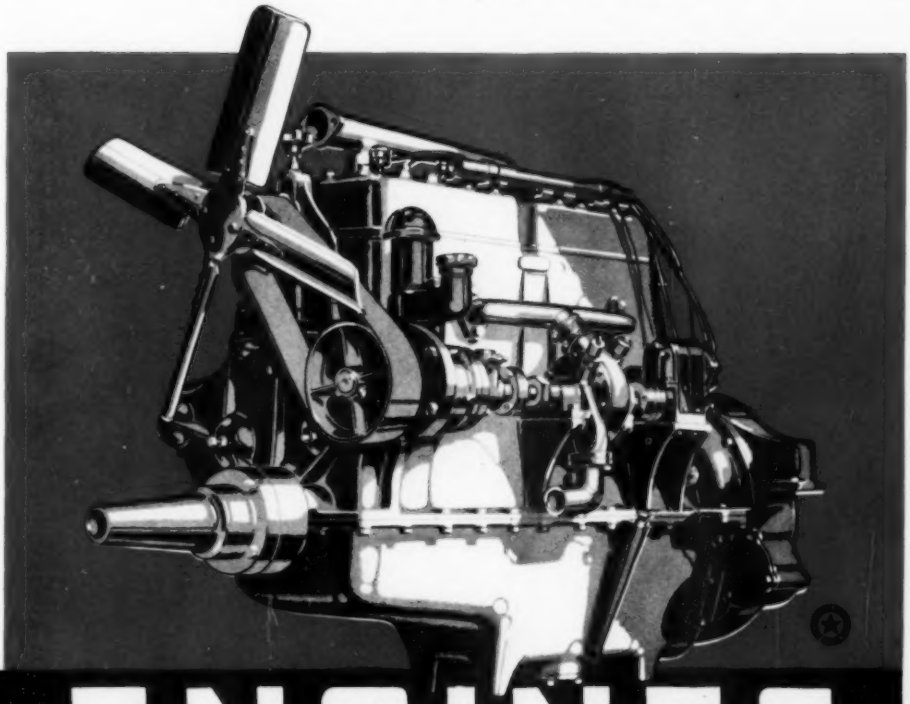

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Such leadership must be earned! It has been. For Hercules engineers have added, to a superior engine whose design keynote is SIMPLICITY and whose manufacturing standard is PRECISION, a "personal engineering service" that wins--and holds--esteem.

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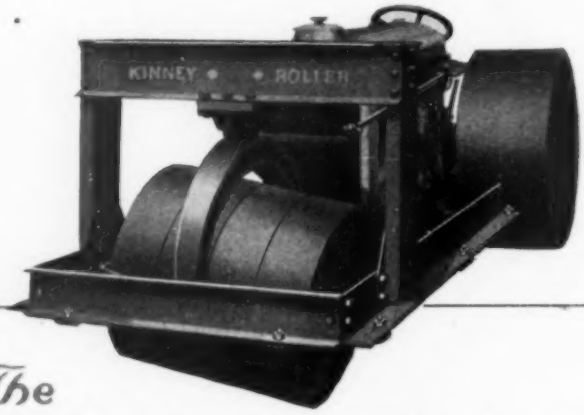

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KINNEY ROADROLLER

Has both quality and price advantage;
Rolls as fast or as slowly as needed;
Steers as easily as the standard tractor;
Is practically impossible to upset;
Rolls a path 63 inches in width;
Is made in 2-, 3-, and 4-ton sizes and up.

The 2-ton size with Fordson body has an approximate shipping weight of 4000 lbs., shipped ready for work; without Fordson body, 2400 lbs. The Roller frame simply clamps to the Fordson body.

We also make the LAWNROLLER and SUPER-LAWN MOWER.

Write for circular

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STANDARDS INC.
118 QUINCY STREET
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See Drill Bits Made
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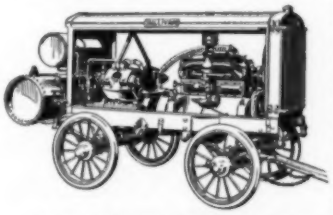
Hammer your drill bits—

is the slogan of the **SULLIVAN** Drill Sharpener, which will be shown actually making hammer drill bits and shanks on hollow steel, at the Chicago Road Show.

This light sharpener, (only 1100 lbs.) is doing a real job for road contractors the country over. It cuts your drilling cost by keeping your steel in "A-1" working condition. The picture is from last year's show.



Sullivan "WK-314" Portable Compressor, with Balanced "V" Cylinders.

You'll be welcome—

at the **SULLIVAN** Booths, W-1 Main Coliseum, and WI-12, Wilson Bldg., where you'll find five models of **SULLIVAN** portable Compressors on display, to say nothing of **SULLIVAN** up-to-date Rotator Drills, Concrete Breakers, Clay Spaders, and a Portable "Turbinair" Hoist.

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SULLIVAN Contractors' Equipment is carried in stock by 68 agents and at 20 SULLIVAN branch offices in the United States.

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SULLIVAN MACHINERY COMPANY

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*Street Bros. Mach. Wks., Chattanooga
Bethlehem Shipbldg. Corp., Bethlehem, Pa.
Chisholm-Moore Mfg. Co., Cleveland, O.
Dake Eng. Co., Grand Haven, Mich.
Erstad Machy. Mfg. Co., Portland, Ore.
Lidgerwood Manufacturing Co., N. Y.
Mead-Morrison Mfg. Co., E. Boston

WINDOW FRAMES AND SASH (Metallic)
*Truscon Steel Co, Youngstown, O.
Wm. Bayley Co., Springfield, O.
Detroit Steel Prod. Co., Detroit.
E. H. Friedrick Co., Holyoke, Mass.
David Lupton's Sons Co., Philadelphia
Penn Metal Co., Boston.
Sykes Co., Chicago.

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*American Steel & Wire Co. Chicago
*Williamsport Wire Rope Co., Williamsport, Pa.
American Cable Co., N. Y.
Copperweld Steel Co., Braddock P. O., Rankin, Pa.
Fischer & Hayes Rope & St. Co., Chicago
General Elec. Co., Schenectady, N. Y.
Habirshaw Elec. Cable Co., Inc., N. Y.
Hazard Mfg. Co., Wilkesbarre, Pa.
Macwhyte Co., Kenosha, Wis.
Nat'l India Rubber Co., Bristol, R. I.
N. Y. Insulated Wire Co., N. Y.
Okonite Co., Passaic, N. J.
J. A. Roebling's Sons Co, Trenton, N.J.
Safety Cable Co., N. Y.
Simplex Wire & Cable Co., Boston.
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Tubular Woven Fabric Co., Pawtucket, R. I.
Waterbury Co., N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

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Mississippi Wire Glass Co., N. Y.

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*Truscon Steel Co., Youngstown, O.
Nat'l Stl. Fabric Co., Pittsburgh, Pa.
Wickwire Spencer Steel Co., N. Y.

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WOOD BLOCKS (See Paving Blocks)

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*Master Woodworker Mfg. Co., Detroit
*Ransome Conc. Mchy. Co., Dunellen, N.J.
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Jones Superior Mach. Co., Chicago.

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WRENCHES
Snap-On Wrench Co., Chicago.

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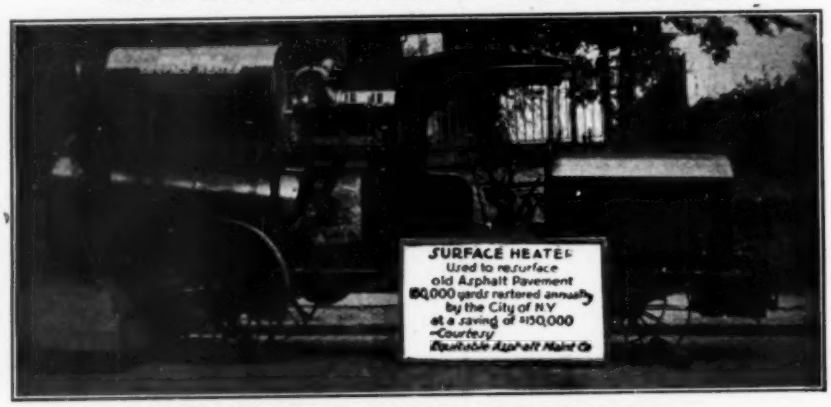


EQUITABLE SURFACE HEATER

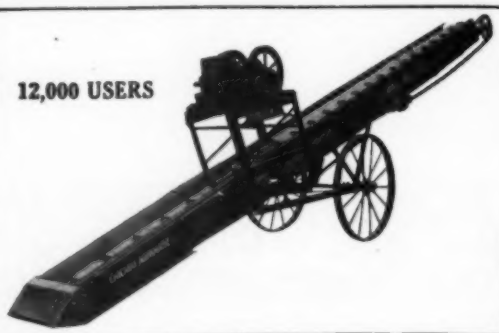
(Improved Lutz Surface Heater)

The new improved model is operated with a gasoline engine, designed for power at low speed. The change in this machine from steam to gasoline practically doubles its capacity, simplifies its operation, saves time and labor, permitting a more economical operation of the machine. It eliminates all dirt, water and steam and makes it possible to resurface without flame, from 1,500 to 2,000 sq. yds. of pavement in an eight-hour day. It is easy to start and operate and anyone that can operate an automobile can easily run this machine.

A letter or post card will bring you full and complete information as to terms.

EQUITABLE ASPHALT MAINTENANCE COMPANY KANSAS CITY, MISSOURI

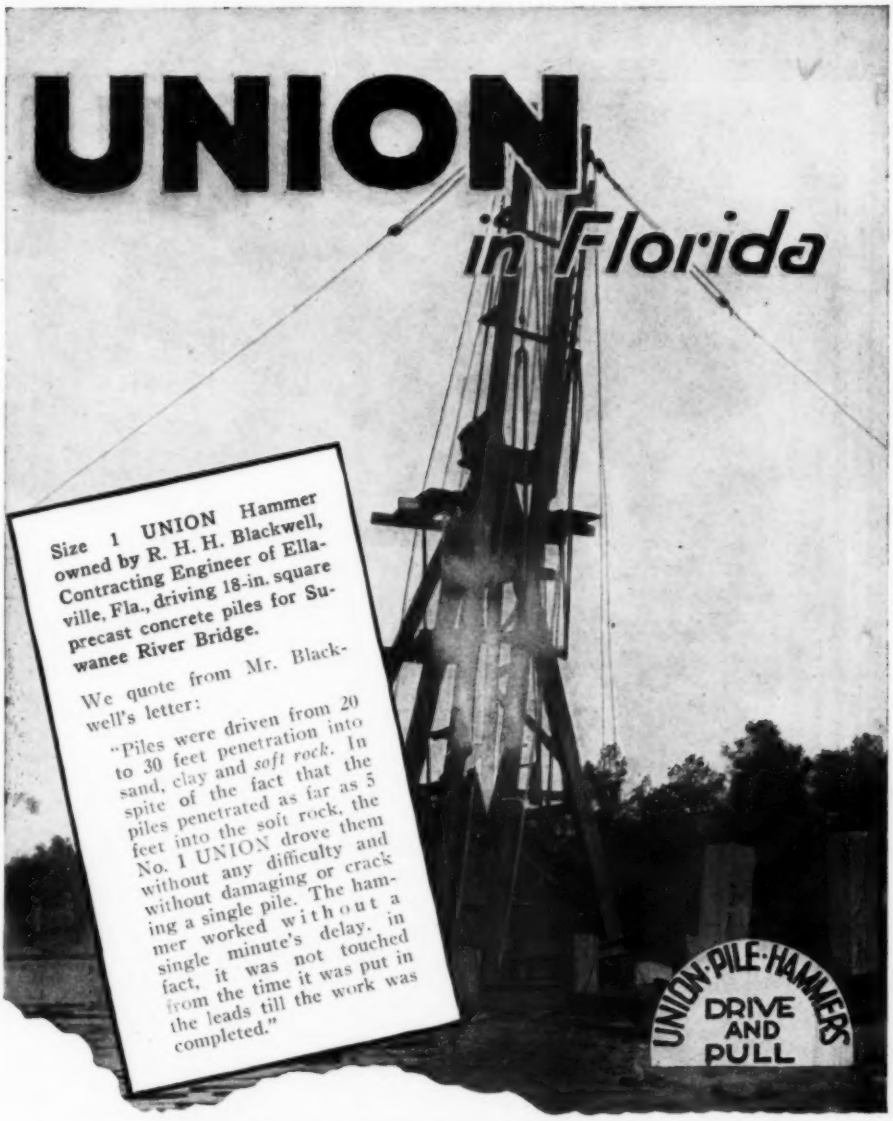
12,000 USERS



The AUTOMATIC
PORTABLE CONVEYOR
WITH THE
Non-Clogging Receiving End
FOR
Every Conveying Purpose

CHICAGO AUTOMATIC CONVEYOR COMPANY

Originators of the Portable Conveyor
998 Old Colony Bldg. **CHICAGO**


UNION
in Florida
Size 1 UNION Hammer owned by R. H. H. Blackwell, Contracting Engineer of Ellaville, Fla., driving 18-in. square precast concrete piles for Suwanee River Bridge.
We quote from Mr. Blackwell's letter:
"Piles were driven from 20 to 30 feet penetration into sand, clay and soft rock. In spite of the fact that the piles penetrated as far as 5 feet into the soft rock, the No. 1 UNION drove them without any difficulty and without damaging or cracking a single pile. The hammer worked without a single minute's delay. In fact, it was not touched from the time it was put in the leads till the work was completed."
UNION-PILE-HAMMERS
DRIVE AND PULL

The complete line of UNION Equipment for construction work also includes Unionlock Concrete Buckets, Union Grout Mixers and Ejectors, Cableway Skips, Tunnel Shields, Air Locks, etc. Write for catalog.

UNION IRON WORKS

Builders of Double Acting Pile Hammers Since 1906

WEST SHORE SIDING **HOBOKEN, NEW JERSEY**

MEAD-MORRISON

"It Just Walks Through the Job!"

That's what J. E. O'Hearn, of M. J. O'Hearn, Inc., Contractors, says about the Mead-Morrison ½-Yard Shovel Crane.

"When it comes to *power*, you can't beat this Mead-Morrison machine; drops the load 30 ft. away and drop it *clean*. Full Circle swing gives steady production—no slowing up! No wonder it just *walks* through the job!"

Users everywhere endorse the Mead-Morrison ½-Yard Shovel Crane. Write for Bulletin No. 131.

Full Circle Swing, Automatic Brakes, Simplified Control, Live Boom, Powerful Cable Crowd—One-Man Operation.

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EXCAVATING HALF YARD SHOVEL CRANE HANDLING

Two for the Price of One - - -

YOU CAN purchase and operate two INSLEY EXCAVATORS for the price of one large machine; then on the general run of light work, you will have a much more flexible outfit, and one which will get into and out of places where it would hardly pay you to go with a big machine. With an Insley you can handle a constant volume of basement and cellar excavation, curb and gutter work, street and alley grading, and do work at a profit which you can't touch with a big machine. Then if you have a big job, you will find that the Insley has a surprising capacity, and will handle 300 to 500 cubic yards a day under average digging conditions. The Insley has the speed and power to handle fair-sized work, and the flexibility and low operating costs to handle smaller work at a profit, and therefore makes an ideal unit for any excavating contractor's plant.

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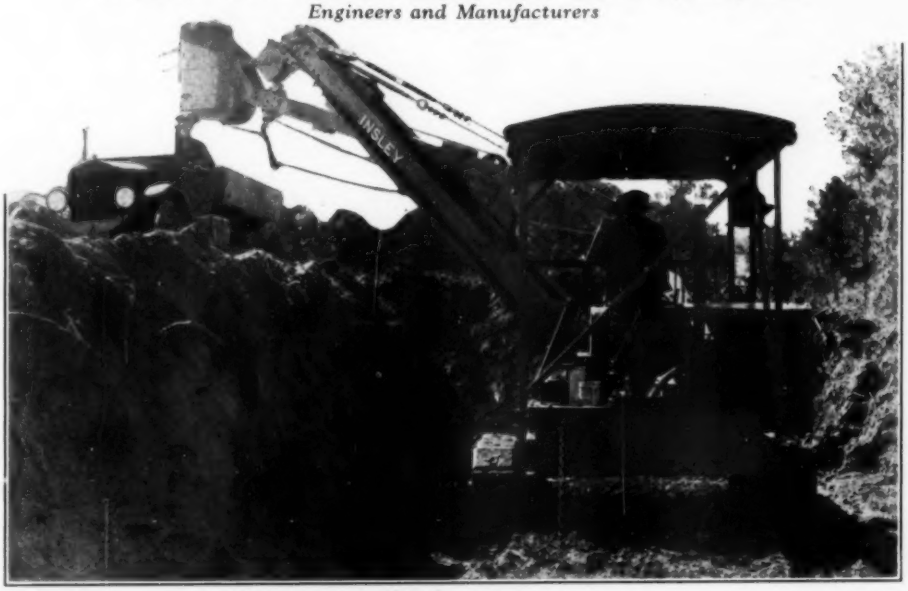
Best of all, it is of low first cost, lower than you would ever expect of a machine as well built and capable of as much work as the Insley, which makes it a value you cannot afford to overlook. Write us today for Catalog No. 51.

INSLEY MANUFACTURING CO., Indianapolis, Ind.

Engineers and Manufacturers



THE INSLEY EXCAVATOR

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Today miners, quarry men and gravel plant operators take the pillar-shaft crusher for granted. With but few exceptions, Telsmith leadership is generally admitted. But it was not always so. It took twenty years of hard work and many thousands of dollars to perfect this modern Telsmith Crusher.

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A New Telsmith Factory

In 1925 — after four successive enlargements the factory failed to keep pace with Telsmith's increasing sales. The new factory pictured below was built. It covers six acres with 55.000 sq. ft. of buildings — the most modern and complete machine shop in the Milwaukee district. With the soundness of the pillarshaft principle permanently established—and with such remarkable production facilities—Telsmith will continue to progress. Telsmith's 12 points of improvement are described in Catalog No. 171 (Telsmith Primary Breaker) and Bulletin No. 2F21 (Telsmith Reduction Crusher). Write today.

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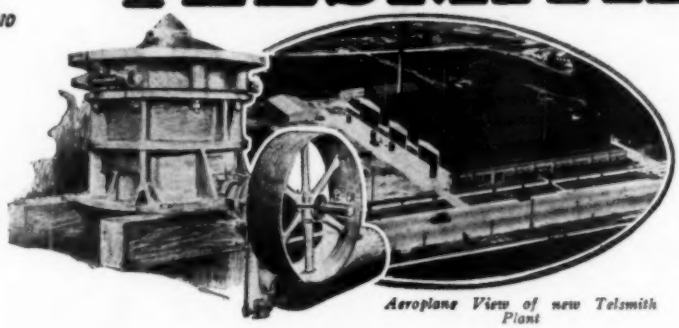

Aeroplane View of new Telsmith Plant

P. B. No. 10

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Vol. XIV No. 1

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January, 1927

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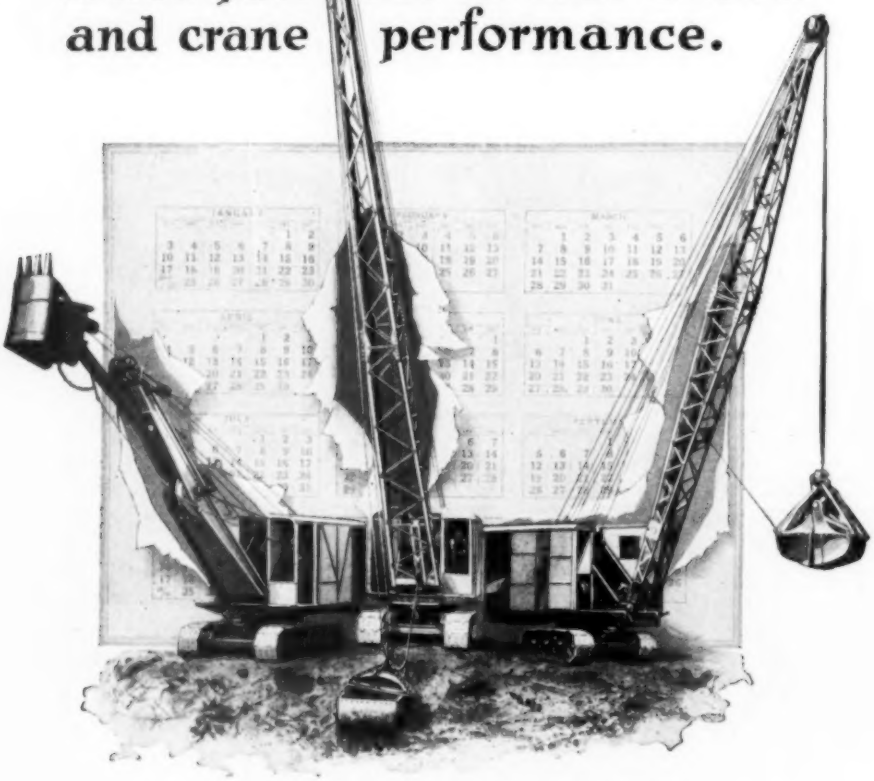
On the Center Drive Truck

Came thru the past year with every promise more than fulfilled,~ an army of enthusiastic users,~ a new pace set for 1927 shovel and crane performance.



See them at the Road Show

THE THEW SHOVEL COMPANY, LORAIN, O.

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

Vol. XIV
No. 1

Contractors' and Engineers' Monthly

January,
1927

Construction Equipment an Aid to Prohibition

A Story Furnished by G. B. Herington, Executive Secretary, Portland, Oregon, Chapter, Associated General Contractors of America

SOME two years ago the zealous police of Portland, Ore., raided a "society" bootlegger and gained rich spoils of genuine pre-war flavoring extracts—in amount, some 1,296 original and ancient packages, each in its vestal virgin robes, "mit gobwebs n' efery-ding."

A committee of the W.C.T.U. promptly volunteered to guard the treasure from dilution, substitution, evaporation, absorption and other "shuns." Having well and truly performed its contract, the committee was later elected, after action by the Court, to the honor of assisting the police in staging the great dramatic opera "Eliminay Shun."

The Portland police are modern chaps, had read of Hamlet in modern dress, thought well of it, and so called on the local A.G.C. Chapter for advice on modern methods of spoiling hard liquor. A portable rock crusher, operated by a Caterpillar tractor and with a bucket elevator discharging into a Ford truck, was recommended as a plant and was loaned for the purpose by A.G.C. members.

THE SETTING OF THE SERIO-COMIC DRAMA RECENTLY STAGED IN PORTLAND, OREGON

The drama was staged in the Outdoor Street Theatre before the Police Temple. The scenery was all set, and an audience of prominent citizens, ancient barflies, police, clergy, the W.C.T.U. in force, smelling committees from various organizations, camera men galore, all

assisted by a sad, but stout-hearted "kiltie" band, made up the ensemble for the performance.

The great gods of the opera began to grind slowly. The mournful and plaintive tones of the bagpipes, backed up by muffled drums, interpolated with staccato but muffled exhausts of the pulsing tractor, accompanying a low, sad and throaty chant from the barflies' chorus, the soft swish, swish of the golden fluid, the sharp jazz clink, clink of the breaking glass dropping into the waiting truck, growls of savage satisfaction and occasional hysterical cries of intermingled horror and joy, completed the orchestral dramatic and soul-searing dissemble movement of Volstead's tragic opera "Eliminay Shun."

The Caterpillar tractor which furnished the motive power for this crashing drama was loaned by the Loggers and Contractors' Equipment Company, 70 Fourth Street, Portland, and the Russell portable crusher and elevator was loaned by the Western Road Machinery Company, 315 Belmont Street, Portland.

From this November tragic scene there now remain but a haunting odor and some few photographs. We cannot reproduce the odor, but we are showing a photograph which indicates how far the Northwest uses hard-rock methods on a hard-boiled job.

News from the Field

The Crane Service Association

AT a meeting in Cleveland recently, the Crane Service Association was formed by a group of companies which offer crane work done by portable cranes on an hourly, tonnage or contract basis, for contractors, who have insufficient crane work to necessitate owning crane equipment. Many national contractors use the local service of these companies for erecting steel, setting cut stone, unloading material, and excavating footings, trenches, etc.

The meeting grew out of the idea of Frank A. Peck, Vice-President, Universal Crane Company, Cleveland, Ohio, who wished to further the cooperation of the various companies offering crane service and to help these organizations develop. About forty representatives of crane service companies, from such cities as Miami, Jacksonville, New Orleans, Birmingham, Chicago, Detroit, Minneapolis, Milwaukee, Mundelein, Wis., Louisville, Ky., Pittsburgh, Cleveland, Philadelphia, New York, Springfield, Mass., Syracuse and Rochester, met and held two sessions daily, with a luncheon together each day and a banquet at the end of the meeting.

The program consisted of talks on crane service company advertising, methods of taking jobs, rentals to contractors, accounting systems, building excavation, hook-block steel erecting, etc., material handling, trench work, winter work, municipal work, and cooperation of owners.

At the close of the last session, the following officers were elected: Peter Herkner, Cleveland, President; Charles C. O'Brien, Cleveland, Vice-President; Q. J. Winsor, Cleveland, Secretary and Treasurer. The offices of the Association will be at 914 Swetland Building, Cleveland, Ohio.

Chain Belt Notes

THE Chain Belt Company, Milwaukee, Wis., has announced that W. H. Brandt, Advertising Manager, has been appointed Assistant Secretary, succeeding George M. Dyke, who has gone to Cleveland to assume the duties of the Secretary of the Stearns Conveyor Company, which is now owned by the Chain Belt Company. A. R. Abelt is now Advertising Manager.

The Chain Belt Company is at present erecting a new building on its 59-acre lot at West Milwaukee to house the engineering and structural work.

Caterpillar Opens Albany, N. Y., District Sales Office

THE Caterpillar Tractor Company, San Leandro, Calif., has announced the opening of a district sales office and distributing warehouse at Albany, N. Y. The Thatcher propellor plant on Learned Street and the Delaware and Hudson Railroad has been leased for a term of years and is being completely overhauled. This location of a large stock of all Caterpillar models and parts will be of value to the rapidly growing Eastern trade of the Caterpillar Tractor Company.

The New York City office, at 50 Church Street, will continue to serve the Eastern export business. H. M. Hale, District Sales Manager, who will be in charge, has announced that all field engineers and factory salesmen covering the New England and Eastern Atlantic States will operate from Albany in the future.

The Road Builders' Catalog-Directory of the American Road Builders' Association

SHORTLY after the 1926 Chicago Road Show, the American Road Builders' Association, Washington, D. C., announced that it would publish a catalog-directory, dedicated to the service of those in the highway industry. This catalog-directory is now being distributed to highway officials, engineers and highway contractors in the United States, as well as to professors of universities presenting highway studies, to engineering laboratories, and a reasonable number of officials in foreign countries.

The opening pages are devoted to greetings from H. G. Shirley, President, American Road Builders' Association and C. R. Ege, President, Highway Industries Association, with four pages devoted to the American Association of State Highway Officials, two pages to the Highway Research Board and three pages to the work of the U. S. Bureau of Public Roads. Following this is the alphabetical index of firm names, a classified index of products, and advertisements of the 1926 Chicago Road Show exhibitors.

Building the Flood Control Works at San Antonio

By MATTHEW PAXTON

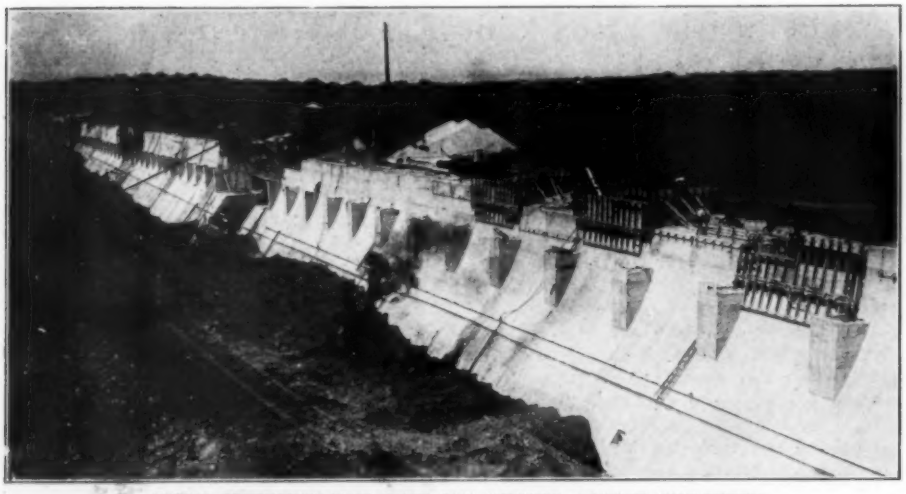
AN interesting example of flood-prevention methods as applied to a small stream is found in the Olmos detention dam at San Antonio, Texas, which has been completed recently..

Floods have endangered life and property in San Antonio ever since a band of monks and soldiers established there an outpost for Spain in 1718. Springs which form the source of the San Antonio and San Pedro rivers were the determining factor in causing the tired men to stop there rather than to go on through the wilderness. Water, normally a blessing, became a curse at uncertain intervals. However, the flood waters arose not from the two rivers but from the Olmos Creek, which was ordinarily a mere ribbon of water. As the collecting agency of a watershed covering 32.4 square miles, the creek could send upon San Antonio a deluge sufficient to cover the adobe huts of the pioneers. Following a flood in 1921 which carried water into the mezzanine floor of the Gunter Hotel, the citizens finally awoke to the seriousness of the situation and a bond issue of $2,000,000 was voted for flood prevention. It was decided that surplus water could best be handled by a dam of the gravity type.

CLYDE TRAVELING DERRICK DEPOSITING CONCRETE IN BLAW-KNOX FORMS ON OLMOS DETENTION DAM

Excavation for the dam began on February 2, 1925, and the first concrete was poured November 23 of that year. The six floodgates,

CLEANING OUT THE SPILLWAY OF THE DETENTION DAM AFTER A FLOOD DURING CONSTRUCTION

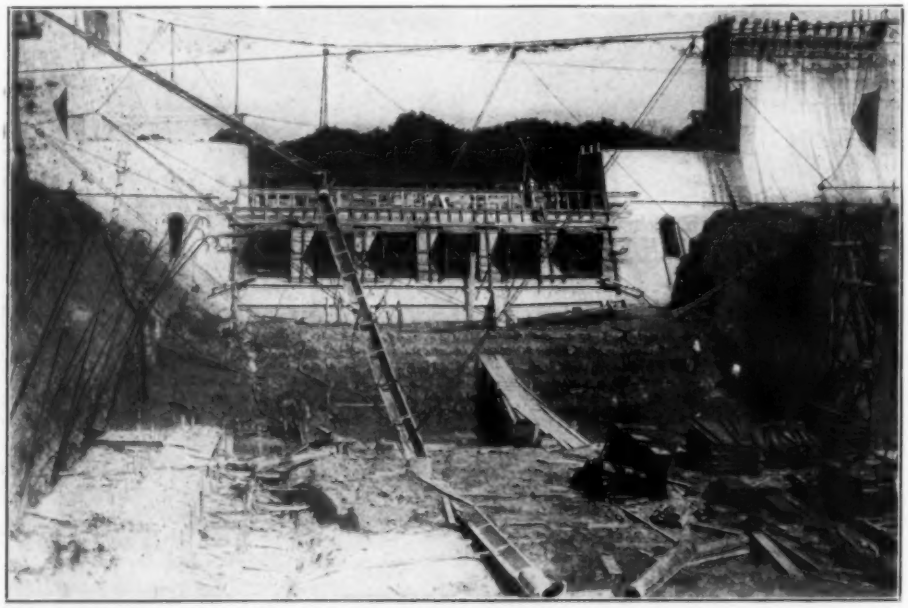


OLMOS DETENTION DAM, NEAR SAN ANTONIO, ALMOST COMPLETED
More than 200,000 cubic yards of dirt was excavated for this dam which was built to prevent the repetition of floods that have destroyed property in San Antonio at various times

which take the place of a spillway, were set in place August 26, 1926.

The area of the detention reservoir above the dam is 1,045 acres, with a storage capacity of 5,390,550,000 gallons. There will be no permanent reservoir above the dam proper, except lagoons for park purposes. Water is to be detained on the watershed only when the channel of the river below the dam is unable to carry the water during flood conditions.

The dam has a maximum height of 90 feet. The total length of the concrete work is 1,940



FLOOD GATES OF THE OLMOS DETENTION DAM AS THEY APPEARED JULY 27, 1926, SHOWING METHOD OF CONCRETING

feet, and approximately 90,000 cubic yards of concrete went into the structure. The dam is designed for full static head plus uplift due to one-half the static head at the heel with no upward pressure at the toe. Additional provisions for prevention of uplift consist of two rows of relief wells emptying into an inspection tunnel which runs the full length of the dam.

Provision has been made for a 24-foot roadway to run along the top of the dam. There is a 6-foot cantilever on the up-stream side, and a 7-foot slant, carried by a line of arches, on the down-stream side. Road approaches have been beautified by masonry, the northeast

ARCHES ON THE OLMOS DAM WHICH WILL SUPPORT THE ROADWAY

approach being 940 feet and the southeast approach 640 feet.

The flood will be discharged through six 6 x 8-foot conduits, controlled by vertically operated gates, each gate being operated independently and electrically, interchangeable to hand operation.

Energy will be dissipated in a hydraulic jump chamber at the foot of the apron, which is built on the curve of the jet under the maximum head.

The McKenzie Construction Company, general contractors, have mixed the concrete at the rate of 500 cubic yards a day in a Smith 40-S tilting drum mixer, the aggregates for which were supplied at this central mixing plant by overhead bins, the crushed-rock bin having a capacity of 160 cubic yards, and the screenings bin a capacity of approximately 80 cubic yards.

A Clyde stiff-leg derrick with a 100-foot boom and 20-foot full wheel operating a 1½-cubic yard clamshell bucket filled the overhead bins. To operate the derrick a three-drum Clyde electric hoist of 80 horsepower, with bull-wheel swinging gear, was used. A 6-horsepower hoist operated a traveling derrick. Cement was elevated to the mixer hopper by a belt-conveyor.

Concrete was discharged from the mixer into 1-¾-cubic-yard Union lock bottom-dump concrete buckets. Three trains of three Lakewood industrial cars, each drawn by a Whitcomb 3½-ton gasoline engine, transported the buckets of concrete for distribution to the Clyde traveling 5-ton stiff-leg derrick with 70-foot boom and 14-foot bull-wheel. This derrick was mounted on two flat cars which could be moved as fast as 300 feet a minute. The cars were switched by a Davenport saddle-tank locomotive.

Picking up the buckets, the derrick dumped them into wooden forms at a point 18 feet from the top, Blaw-Knox traveling steel forms were used at the crest.

In the course of construction of the dam,

PROGRESS PHOTOGRAPH OF EXCAVATION WORK ON THE OLMOS DETENTION DAM

flood conditions arose which made additional cleaning out necessary, the work being done with an Erie steam shovel.

Four thousand carloads of materials could be used in the construction of the dam, including 418,000 pounds of reinforcing steel.

Although the flood menace was removed when the gates were set in place in August, the dam was not completed until December. The total cost of the dam was $1,500,000. The remaining $500,000 will be spent in straightening the San Antonio River, which runs through the heart of the city.

For portraits of some of your friends among the distributors and sales managers, see pages 73 to 84 of this issue of CONTRACTORS' & ENGINEERS' MONTHLY.

Who Pays the Bill?

By A. QUANTITY SURVEYOR

A SHORT time ago, a fraternal society in one of our neighbor cities decided to erect a new lodge building. A fund of $200,000 was available. An architect was selected to prepare the necessary plans and a building committee was appointed. As might be expected, this committee was full of suggestions. The architect knew that he had to keep the cost of the building within the limit set, but he was obliged to add one thing and another. "A little change like this wouldn't amount to much," he was told first by one member of the committee and then by another. By the time the plans were completed the architect began to have serious doubts as to whether the cost of the building as shown on his plans would not exceed the available funds. He called me to his office one day and asked me what it would cost to obtain a quantity survey of the building in question. I looked the plans over and made him a price of $350. He agreed, but told me he would have to take the matter up with the building committee, which he was confident would give its consent. Several days later he called me up again to advise me that the members of the committee had refused to give their consent. They could not see that anything could be gained by a quantity survey and had come to the conclusion that it would simply be a waste of money to spend $350 for the work.

The plans were put on the market. When the bids were opened the lowest was found to be $231,000. And since one cannot very well put up a $231,000 building with only $200,000 to spend, all bids were rejected.

Now let's do a little arithmetic. Six general contractors prepared estimates for this work. I know that it cost one of them $300 to prepare his estimate and there is no reason to assume that it would have cost the other contractors less. Six times $300 is $1,800. There were at the very least sixty subcontractors estimating various items entering in the construction of this building and I believe I am very conservative if I put their average expense for estimating at $15. Sixty times $15 is $900, and $900 plus $1,800 makes $2,700. To state the matter briefly, $2,700 was paid out to ascertain the cost of a building when the same result could have been obtained for $500. I am adding $150 to the cost of the quantity survey to cover the necessary expense of pricing the quantities as presented.

Whenever you pay $2,700 for something that can be done for $500, there is waste of money and energy. There can be no argument on that point.

It is also a recognized economical principle that the consumer pays the cost—always. When it comes to construction, the consumer is the owner. It is perfectly clear that a contractor who spends a certain amount of money for an estimate is not going to pay that money out of his own pocket; he charges it up to overhead expense and absorbs it on other work. If he doesn't he is not going to be a contractor very long.

Clear as this seems, there are people who cannot see it in that way. I met one of the committeemen who had decided that it would be a waste of money to have a quantity survey made, shortly after the bids were opened and asked him if he still thought it would have been a waste of money to have a survey made. "Why," he answered, "it is of course unfortunate that we had to reject the bids but, anyhow, it did not cost *us* anything."

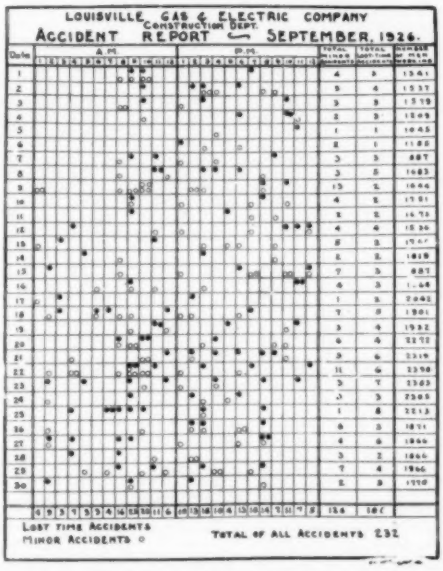
Safety and Efficiency in Construction

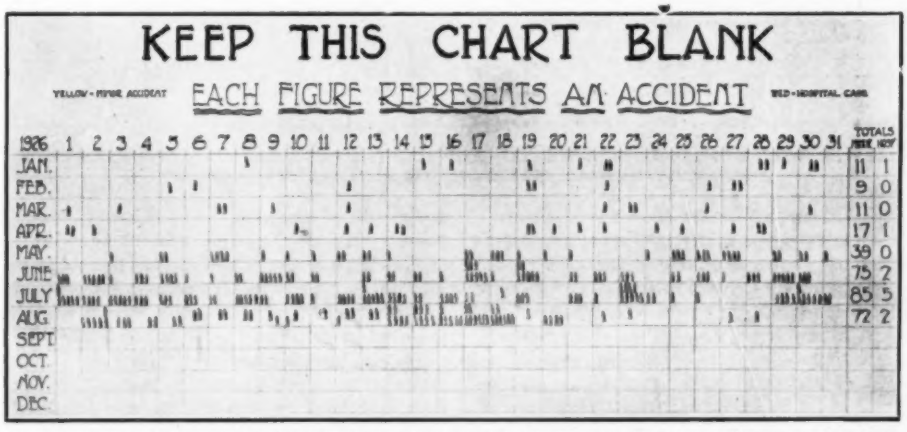
By A. G. BUTLER

General Superintendent of Construction, Louisville Gas and Electric Company, Louisville, Ky.

LOUISVILLE, a city of 311,000 population, is served with gas and electricity by the Louisville Gas and Electric Company, which is under the supervision of the Byllesby Engineering and Management Corporation. Since this property was taken over by the H. M. Byllesby Company, in 1913, there has been continuous construction work on power-houses, substations, gas plants, gas holders, office buildings, storehouse buildings, garages, and all other property necessary for maintaining service to meet the exacting demands. This construction organization has never been under 50 men and now numbers about 2,000.

Much of the construction work is done in plants which are in operation, and a great deal of it is done regardless of weather conditions. It is for that reason more hazardous than the general run of building work, but to offset this we have the advantage of being able to plan our work so as to keep at least the nucleus of a large organization steadily employed. All the construction work, such as foundations,

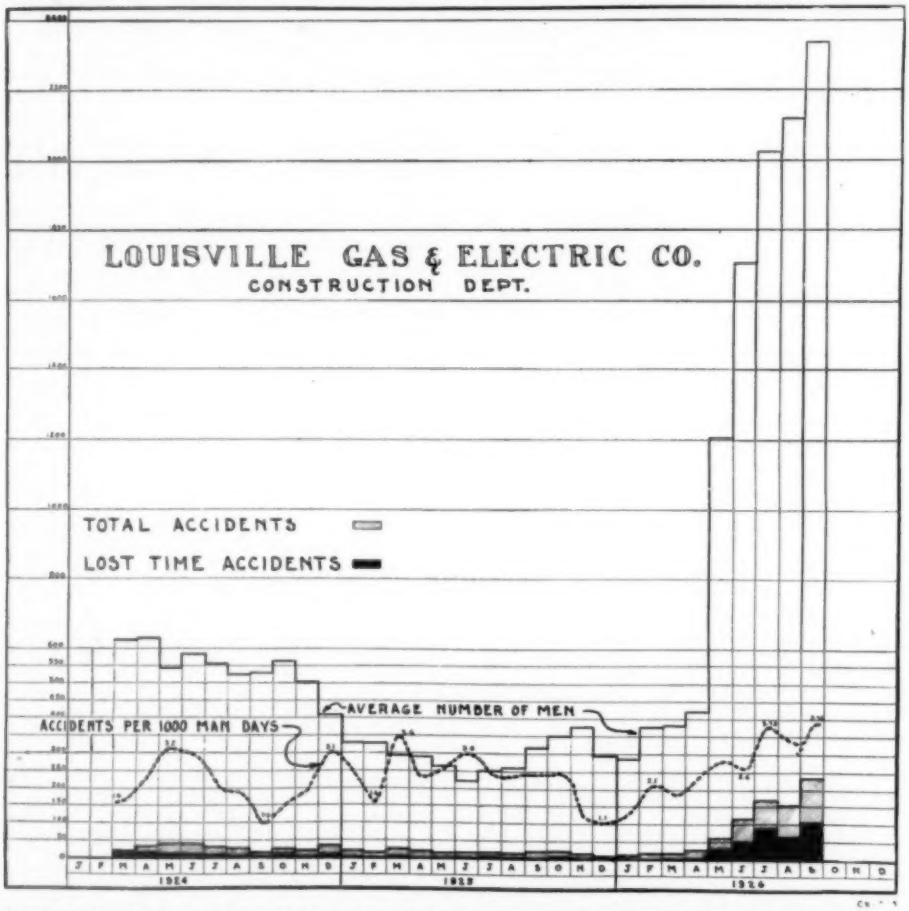




ACCIDENT CHART OF THE CONSTRUCTION DEPARTMENT, LOUISVILLE GAS AND ELECTRIC COMPANY

tunnels, conduit lines, wrecking, concrete work, structural steel erection, smoke stacks, pipe work, machinery setting, machinery moving, railroads, electrical work, etc., is done with our own forces. A great deal of the electrical work is done in stations that are alive. Continuity of service is the first consideration, so that construction work is done at all hours, and much whether it be with automobile or on construction work, is not conducive to safety of life and limb.

From twenty-five to forty cents out of each dollar we spend on construction work is for labor. You have all experienced the cost of training a man for some kind of work, and no doubt all of you have experienced the cost of



GRAPH SHOWING THE TOTAL ACCIDENTS AND LOST TIME FROM ACCIDENTS IN THE CONSTRUCTION DEPARTMENT OF THE LOUISVILLE GAS AND ELECTRIC COMPANY

of it in hours not meant for man to work in.

We, as a public utility, are subject to supervision not known to private business. We must be prepared at all times to justify every dollar invested, so that when rates are fixed they will allow a return on that dollar. For that reason we must secure full value for each dollar. Each dollar must begin earning as soon as possible, so speed is important. High speed, attempting to do work with a man not well trained. If a man is off on account of accident or for any other reason, it is sometimes necessary to do work with inexperienced men, and this is expensive. It is not only expensive, but it increases the danger of accident to the man not properly trained and to his fellows. In addition to the loss of a trained man, if his lost time is caused by accident we are penalized

sooner or later by the insurance company. So, as you can see, we are forced to look to the safety of our men.

We continually have this subject before us in one form or another and attempt to have it always before our superintendents, foremen and workmen.

The operating company has a safety committee that meets monthly and is composed of the heads of the departments. Accidents and methods of preventing accidents in the future are discussed by this committee. On our construction work we have a safety man to keep on the lookout for hazards; to keep the question of accident prevention before the foremen and the men by word of mouth and by the bulletin board; and to investigate each accident that does occur. Every time I visit a job I take up some form of accident prevention with the superintendent and with the foremen. No cost is spared to keep the construction plant safe. This means not only safety to the men but continuous operation of the plant. A great many of our foremen have attended the Foremen's School held periodically under the direction of the Louisville Safety Council. We have had schools in first-aid work, and on one or two occasions this has been the means of saving a life that might otherwise have been lost before a doctor could reach the scene of accident.

The slighest scratch or bruise is reported as an accident, but, strange as it may seem, the more serious accidents happen on work that is considered not particularly hazardous. We have more accidents than we like to have, but we are continually preaching safety and at times it looks as though we are making progress. In the last two years we have had as low as one lost-time accident in a month with over 200 men employed. Our frequency rate has been as low as one accident per one thousand man-days and as high as 3.95 accidents per one thousand man-days.

I believe it is generally accepted that the best accident prevention work can be done through the foremen, this, of course, after the job has been well planned and properly equipped. If foremen can be secured who are true sons of Martha,—wary and watchful all their days that their brethren's days may be long in the land,—and if these men are properly trained to think and work safely, there will be little to do on safety work or accident prevention, and efficiency, as far as the payroll is concerned, will take care of itself.

The very nature of construction work is such as to cause peaks and valleys in employment. With sufficient foresight and by carefully planning the work in advance, a great many of these peaks can be cut off and the valleys filled up.

We are now building a 108,000-horsepower hydro-electric plant to develop the power at the falls of the Ohio River at Louisville. The dam is to serve both for navigation and for power purposes, and is being built as a contract by the Byllesby Engineering and Management Corporation under the supervision of a corps of engineers of the United States Army. The project will total approximately ten million dollars and is being carried on as one job.

The working season in the river is short and uncertain, and for that reason, when the river permits, work must be carried on continuously, twenty-four hours a day and seven days in the week. Surprising as it may seem, with the rapid expansion necessary for this work, neither the frequency rate nor the severity rate on accidents has increased materially. In fact, in the months of May and June, when this expansion was taking place, there was a decrease.

The same careful study was given to the construction layout on this job as was given to the economics of the project and the design of the permanent structure. These studies covered a period of nearly two years and all of the different possibilities of handling the work were considered. The studies even included methods of handling visitors safely.

Of course, we were fortunate in having a rather large organization ready for this work, and probably this has been the greatest factor in the prevention of accidents.

DISTRIBUTION AND KINDS OF ACCIDENTS ON CONSTRUCTION WORK OF THE LOUISVILLE GAS AND ELECTRIC COMPANY, JAN.-AUG., 1926

	Jan.	Feb.	March	April	May	June	July	Aug.
Foreign matter in eye.	2	3	4	6	10	8	28	18
Injury from nail.....	..	..	..	1	3	13	21	28
Burns	..	3	..	..	3	6	24	9
Strained muscles.....	1	..	2	2	7	7	23	10
Falling material.....	..	1	2	1	1	7	4	7
Infected cuts & scratches	1	3	2	2	5	13	6	15
Cuts from various tools	..	..	..	..	2	4	9	10
Falls, various	..	3	..	2	4	16	19	26
Faulty material.....	..	..	2	..	..	..	..	..
Mashed members.....	4	2	2	7	13	27	24	17
All other causes.....	1	2	4	3	15	19	11	15
Total	9	17	18	24	63	120	169	155

ACKNOWLEDGMENT.—From a paper read before the Fifteenth Annual Safety Congress, at Detroit, Mich.

England Appreciates American Machinery

American One-Man Excavator Subject of Newspaper Editorial

LAST fall an Insley excavator was put to work on the Strand, in London, to take care of some excavation. The following editorial appeared in the London Telegraph, with reference to the introduction of this machine into the British Isles and the interest which it is creating:

The Automatic Navvy

"Amid the manifold changes which have befallen London in the last century, and most notably in the last few years, there is one figure that has persisted unaltered. It is that of the navvy. Passing fashion has not dealt with him as it has with other types of the street. The cabby with his box-cloth coat and cape of many tiers has gone for ever; the newspaper seller in hat of silk has given place to less elegant successors; the lamplighter and the apple-woman are almost extinct. Only the flower-girl and the navvy remain. But while the one sports the millinery of the 'nineties, the navvy has preserved a vocational dress that is older than the memory of living man. His habits, likewise, are little changed. He camps out in the streets with as little concern for the ceaseless roar and impatient throbbing of the traffic as in the leisurely days that preceded the coming of the motor-car. To be sure, he has had mechanical appliances put into his hand, but he has remained the same navigator—to give him his full title—as he was when he deserved that name from his labor in the excavation of canals. Now, at last, he is threatened. In the Strand there has appeared an automatic shovel, which can do the work of many navvies, and, what is more, can discriminate between one sort of débris and another. Thus we learn that 'it refuses to lift the heavier stones, but sifts out the smaller, and deals with them at the rate of hundredweights an hour.' It seems only yesterday that the apostles of 'scientific management' were bent on having every navvy measured for his shovel, so that he might obtain the maximum of effect with a minimum output of energy. Now we are told that he will soon be in retreat before an army of robots. The streets will be the duller by his passing. For a time we shall linger to watch the automatic navvy, but the novelty will quickly pall. The attendant humans in their dungarees will cut no such picturesque figure as the navvy. We shall never see him meditatively frying a chop in the middle of Bond Street or stirring a

INSLEY EXCAVATOR AT WORK ON THE STRAND, LONDON, ENGLAND

gargantuan can of tea with a jack-knife. Physical strength will not be his qualification for employment. Like the rest of us, he will be the slave of a machine, though he supposes himself its master. There we touch on the fascination which the navvy exercises on our imagination. Almost alone in the modern world he labors at a primitive task with muscle and sinew. Nearly fifty years ago Herbert Spencer observed that he ate 'largely of flesh,' and thus derived the strength which made him the superior of the navvies of every other nation. His automatic successor will enjoy no such proud pre-eminence."

Quantity Survey

By GEO. B. BURGESS
Estimator, H. R. Beebe, Inc., General Contractors, Utica, N. Y.

AT the first annual banquet of the American Institute of Quantity Surveyors, held at Chicago last June, one of the guest speakers of the evening, who, by the way, is a prominent Chicago architect, asked the question, "What is quantity survey?"

It is true that the name, or phrase, "quantity survey" is comparatively modern in this country, but it is fast becoming applicable to a certain part of the building industry. It seems to be quite agreed among quantity surveyors that quantity survey is the science of measurement and tabulation of all materials and labors required to execute a certain architectural or engineering structure.

This definition may sound formal or pedantic, and may perhaps cause a snicker among a few members of certain professions closely related to the building industry. Whether quantity survey should be termed a science may be debatable, but it certainly is the art of ascertaining facts and figures, and requires technical and practical knowledge, combined with skill in application. The quantity surveyor in private practice is the middleman between the architect or engineer, and the contractor. Actually, he is a non-producer because he does not create in theory or produce in reality. In other words, he has no part in planning, designing, or preparing working drawings and specifications, as has the architect or engineer; nor does he assemble, construct, or erect a structure, as does the builder. He does, however, occupy a very important place in the preparation of the estimate of cost of a project, and his work is indispensable. Now, then, what constitutes a quantity survey and what is its scope?

One of the officials of the Associated General Contractors of America, speaking to the members of the American Institute of Quantity Surveyors, at Chicago, said, "A quantity survey should include a complete schedule of all materials and labors required to execute the work, and it should contain sufficient information to give a complete mental picture of the entire project." Nearly all surveyors furnish a schedule of all materials, and that, alone, if properly and accurately set forth, is quite a feat. To add the mental picture is going quite a bit farther. There is a difference of opinion among contractors as to just how much the survey should include and what standards should be followed.

It would seem that a quantity survey should include a complete and accurate schedule of all items of material to complete the work according to the drawings and specifications. All materials should be set forth in the proper units for applying labor values. All grades, classifications, qualities, mixtures, and kinds of materials should be clearly stated. All subcontracts entering into the work should be included. All items of labor not carrying material should be scheduled, carefully described and explained. Every item of material, and every labor operation that must enter into the execution of the work, should be included. If all materials or labors can not be clearly described, sketches and details adjacent to each item should be supplied. This is particularly important in the delineation of the survey.

Quantity surveys like this are quantity and labor surveys, and they approach very closely to the complete mental picture of the entire project. They afford the executive, who values the items in dollars, a complete, comprehensive picture of the whole job. They take time in preparation, but they save time in setting prices, and their worth is enhanced accordingly. Workmanship, neatness, and accuracy must always predominate. All work should be lettered or typed. Nothing should be offered that savors of uncertainty or doubt. The entire survey should be a *positive* document. Furthermore, quantities given or set forth in the summary should be supported by the take-off sheets. Each and every item on the take-off sheets should have its origin or location given. In order to emphasize the mental picture of the survey, each item of the mason and carpenter work should appear in the proper sequence of the actual field construction.

Now we approach the question of the accuracy of a quantity survey. The old yelp goes up that the architects and engineers do not guarantee their drawings free from errors or discrepancies; the quantity surveyors do not make an accurate and true delineation of their work; but the contractor assumes the obligations of all concerned, including, of course, his own. Allowing this to be true, and leaving the architects and engineers out of it, pray tell us just how closely and accurately should the quantity surveyor produce his work, to satisfy the contractor. How much, in percentage, of the total of each item may his figures vary or be inaccurate?

Remember this, that the largest gamble of all is in the human element of the field operations. Get this one, and write it on your cuff, if you please, that the one who prices or places the unit values on the labor side of the survey is the most inaccurate one of all. He is the one who yelps about inaccurate quantities, and he is wrong or inaccurate more than any one concerned. He doesn't begin to equal or approach the accuracy of the quantity surveyor. He can never do it. He is dealing with the human element and is entirely dependent upon their action and output. Any one who values the labor items in an estimate is the weakest link in the chain. Each and every one of his labor prices is, and always will be, based upon assumption. From prior costs on jobs of similar character, and from an analysis (sometimes of a cursory nature) of plans, details, and local conditions, he concludes he should get a certain number of brick laid per hour per mason. He also concludes that a carpenter will hang a certain number of doors per day, or that a plasterer will put on so many yards of scratch and brown coats of plaster in a certain time.

He reinforces his assumptions by quick reference to handbooks which tell exactly what should be done, what has been done, or what may be done. He arrives at a conclusion along these lines. Each item is priced or valued accordingly. What are the results? Any contractor or estimator will admit that the costs of the actual work do not support, item for item, the estimated values. The costs are either over or under the estimated prices and comparisons very often show up big differences.

The setting forth of labor values on a quantity survey is based upon what has been done and what it is expected may be done. This is based upon assumption and the efficiency of the human element. It is true that the art of quantity surveying is based upon the efficiency and competency of the surveyor. However, the tabulations of a competent and experienced quantity surveyor surely approach accuracy more closely than the assumed values of the estimator.

Quantity surveying is held to be a separate and distinct proposition from estimating. The true quantity surveyor does not give values or attempts to do so. His work consists solely of cold mathematical tabulations derived from plans, specifications, and details and extended by computations and summary.

At this time a little is being said and written about incomplete plans and vague specifications. Much more could be said. The quantity surveyor has a disagreeable task at times in trying to interpret drawings that are not clear, accurate, and properly set forth, and specifications that are vague and ambiguous. It is understood that the quantity surveyor finds errors and discrepancies in drawings and specifications. He does not search for errors with critical intent, but in order to take off accurate quantities, the drawings should prove with each other and specifications should be clear. Valuable time is often wasted in making a correct interpretation of vague and ambiguous specifications, using a magnifying glass on faint blueprints (attributable to a faint pencil-tracing and not the blueprinter), and trying to prove drawings that do not prove or check.

The quantity surveyor must ascertain his quantities from positive drawings and specifications in order to produce a positive survey. Sufficient time is rarely given to make a complete mental picture for the builder without entailing considerable night work.

Quantity survey as furnished by the commercial bureaus, is rapidly being established on a firm basis. Reliable, careful and competent surveyors are producing accurate surveys and are establishing confidence among the members of the building industry. No doubt some work is being offered that is not reliable, but this will usually be found to be cut-rate. The American Institute of Quantity Surveyors, organized at Chicago last June, elected for its officers men of high standing, education, and experience. The Institute is promulgating high ideals and equitable ethics, and includes in its membership surveyors whose work will commend itself to the building industry.

When you have a favor conferred on you, remember it. When you confer a favor, forget it.—Hyster Hy-Spots

The Construction of the Eye-Bar Cable Suspension Bridge at Florianopolis, Brazil

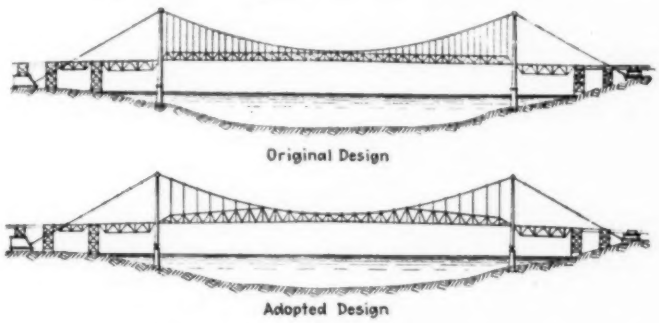
FOUNDATIONS by DR. D. B. STEINMAN
Consulting Engineer, New York City
STEEL SUPERSTRUCTURE By WM. G. GROVE
Assistant Engineer, American Bridge Company, New York City

FLORIANOPOLIS, the capital city of the state of Santa Catharina, Brazil, is located on the Island of Santa Catharina, which is separated from the mainland by a narrow strait. The island is about twenty-five miles long and the city is located about midway on the strait side of the island. This strait is too shallow to permit the passage of large ocean-going vessels, although the coastwise Brazilian vessels can pass through. The city had no physical connection with the mainland and there was no railroad connection on the mainland opposite the city.

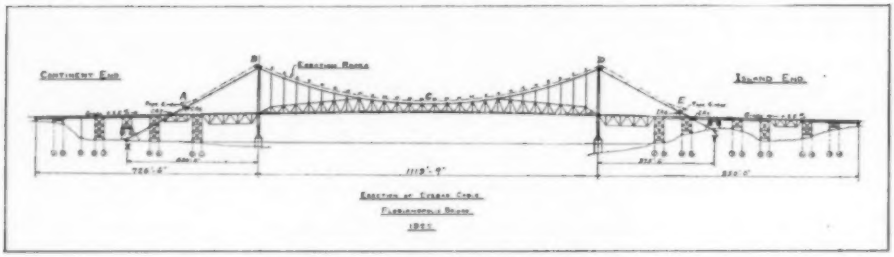
To increase ocean trade with his native state, one of the recent governors conceived a fourfold project, which included the building of a port at the northern end of the island, the construction of about twelve miles of electric railway between the new port and the city, the building of a bridge connecting the island with the mainland, and the construction of about one hundred miles of railroad on the mainland, connecting the bridge with a railroad line running through the interior between Rio de Janeiro and Montevideo.

The general contract for the third part of this project—the construction of the bridge across the strait—was let by the state of Santa Catharina to the Brazilian firm of Byington & Sundstrom, and this firm asked the United States Steel Products Company to design a bridge of the cantilever type. About the same time, Mr. Sundstrom also asked the consulting engineering firm of Robinson & Steinman to design a bridge of the wire cable suspension type. After several modifications of the two designs it was found that the suspension bridge was the cheaper design and was therefore adopted. While making the original design of the cantilever type structure, some of the American Bridge Company engineers became convinced that the suspension bridge was the more economical type for this location, and made independent studies on a suspension bridge design, using high-tensile, heat-treated eye-bars for the main cables, instead of parallel wires or wire rope. Recent experiments in the heat treating of steel, by C. W. Bryan, Chief Engineer, and C. G. E. Larsson, Assistant Chief Engineer, of the American Bridge Company, had resulted in the production of a steel having an elastic limit of between 75,000 and 100,000 pounds per square inch. With this high elastic limit, it is permissible to increase the unit working-stress from 16,000 to 50,000 pounds per square inch, thereby requiring less than one-third as much steel as would be necessary in the use of the ordinary 30,000-pound-per-square-inch elastic-limit steel.

As a result of these experiments, the suggestion was made by William G. Grove, of the American Bridge Company, to substitute eye-bars for wire in the main cables, and as the estimated cost of an eye-bar cable, based upon bids, was lower than the estimated cost of a wire cable, the eye-bar cable was adopted by Mr. Sundstrom. Dr. D. B. Steinman then



ORIGINAL PARALLEL-CHORD DESIGN AND ADOPTED CURVED-CHORD DESIGN FOR FLORIANOPOLIS BRIDGE



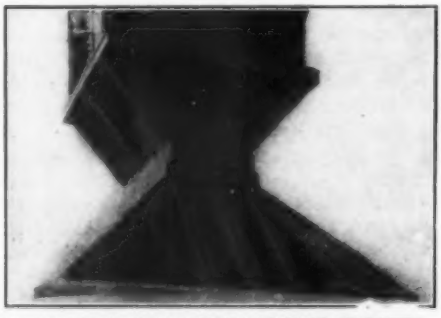
PROFILE OF FLORIANOPOLIS BRIDGE

suggested lowering the cable so as to make its central part act as the top chord of the stiffening-truss. This resulted in a material saving of steel, and Mr. Sundstrom also adopted this recommendation. It was therefore found that the cable stress was such as to require four eye-bars, each 72 inches wide and varying in thickness from 1 13/16 inches at the center of the span to 2 inches at the towers, for each of the two main cables.

Construction of Foundations

Huge, irregular boulders in the ocean-bed were found to have made the rock soundings quite misleading. The presence of these boulders and the slope of the bed-rock surface complicated the foundation work. An open square cofferdam of steel sheet-piling was driven for each of the four main pier foundations. The sheet piles, ordered to length based on the previous soundings, went down to a maximum of 38 feet below mean-water level, while rock lay at depths of from 30 to 60 feet below water.

A novel procedure was adopted in the case of the north continent pier. After excavation within the 28-foot square cofferdam was carried down to near the bottom of the sheet piles, a central test pit 8 feet square was sunk within the cofferdam to bed-rock at elevation —59. This test pit was concreted and then adjoining sections were similarly excavated and concreted in succession until the entire area within the cofferdam had thus been underpinned down to bed rock. On the concrete footing so obtained the square pier was built up, steeping off at different levels and terminating in a cylindrical shaft.



ROCKER AND BASE CASTINGS AT FOOT OF TOWER

In the adjacent south continent pier, cofferdam rock was found at elevation —32 over the greater part of the area, falling off sharply to elevation —60 at one corner. This corner only had to be sheeted-down below the cofferdam sheeting. The two island main piers reach rock at elevations —37 and —50, respectively.

The four main piers of the Florianopolis bridge are cylindrical concrete shafts 22 feet in diameter with simple copings. A separate pier cylinder is provided under each tower leg.

Fabrication and Erection of Steel Superstructure

The general scheme of erection was to stretch a temporary wire cable of sufficient strength to support the permanent eye-bar cable, from the continent viaduct floor level up to the top of the continent tower, across the channel to the top of the island tower, and down to the island viaduct floor level, this temporary wire cable to be placed approximately six feet higher than the elevation of the permanent eye-bar cable. Our original intention was to use the wire rope main hangers for the temporary cable, and to ship these hanger ropes to the site in lengths sufficient to stretch across the channel. After serving to erect the two permanent eye-bar cables, the rope would be cut up into the correct lengths, socketed, and used in the proper position on the bridge for the main hangers.

The lowering of the cable, however, almost completely eliminated the permanent rope hangers which we had counted on using for our temporary rope cable. The number of linear feet of rope for the hangers in the adopted

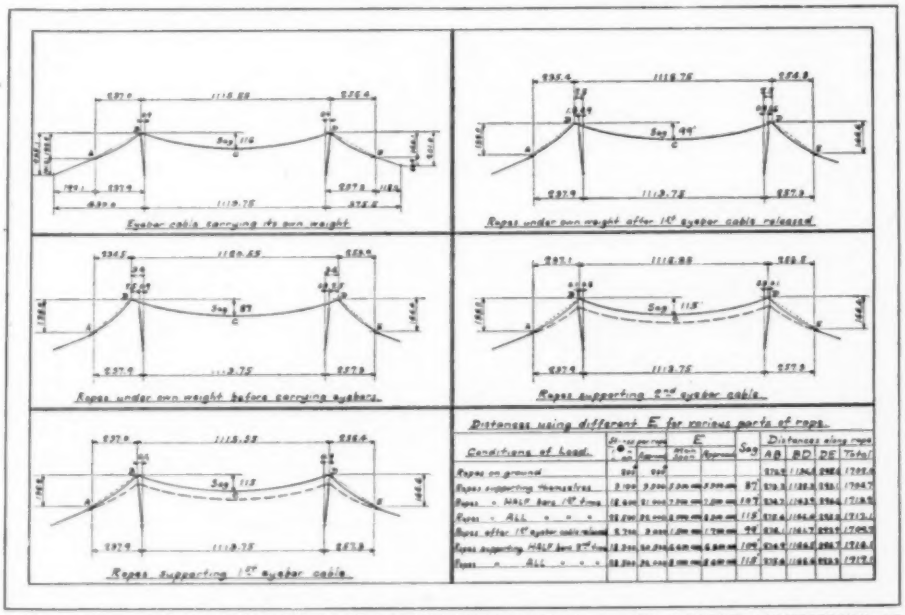
design was only a small percentage of the amount of rope originally used for the hangers in the conventional design, and therefore some substitutes had to be provided. It was finally decided to use a temporary cable made up of flexible ropes one inch in diameter, for the reason that these flexible ropes could be used as ordinary hoisting ropes in our erection department after serving their purpose during the erection of the eye-bar cables.

The permanent hanger ropes were made of six strands with a wire center, having a modulus of elasticity of from 12,000,000 to 15,000,000. Flexible ropes 1-inch in diameter are made of six strands with a hemp center and have a variable modulus of elasticity depending upon the length of lay, the number of wires to the strand, the method of spinning, and the stress in the rope. Our method of erection counted upon supporting the permanent eye-bars from the erection ropes by means of hand-operated chain hoists, and then swinging the eye-bar cables by releasing or playing out the chain on the hoist, which operation would lower the eye-bars until they supported themselves as the permanent cables. During this operation, the erection ropes would be relieved of the stress they had while supporting the bars, and would therefore be shortened so that the sag at the center of the span would be materially less and the ropes would move up until they again supported only their own weight.

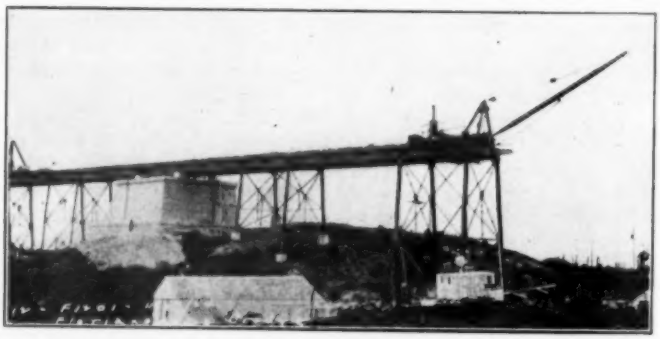
It was necessary, therefore, to know something about the actual behavior of the erection ropes, because the problem was two-fold—first, to make the ropes short enough at the start so that when they had elongated under the weight of all the eye-bars the sag at the center would not be so great as to prevent the final bars being placed; and, second, to make the rope long enough at the start so that the amount of chain-play on the chain hoist would be enough to permit the eye-bar cables to be swung.

If the erection ropes were not short enough at the start, it is conceivable that they would stretch so much under the weight of the eye-bars that all the eye-bars could not be placed without great difficulty and, conversely, if the erection ropes were made too short, it is also conceivable that when all the chain in the chain hoist had been played-out, the eye-bars might be still partially supported from the erection ropes.

The one-inch diameter hoisting rope has an ultimate strength of 90,000 pounds per rope and, with a safety factor of three, a working stress of 30,000 pounds per rope was permis-


Eyebar cable carrying its own weight
Ropes under own weight after 1st eyebar cable released
Ropes under own weight before carrying eyebars
Ropes supporting 2nd eyebar cable
Ropes supporting 1st eyebar cable
Distances using different E for various parts of rope.
Conditions of Load.
Sag
Distances along rope
AB
BD
DE
Total

SAG AND MODULI OF ELASTICITY FOR THE ERECTION ROPES UNDER VARIOUS CONDITIONS OF LOADING



TRAVELER ERECTING ISLAND VIADUCT

sible. It was found that with this working stress, twenty-four ropes would be necessary to support the four lines of eye-bars with their connecting pins. The ends of the twenty-four ropes were wrapped around rope girders placed just above the floor level of the viaduct, these girders in turn being fastened back to the permanent eye-bar cable below the top of the viaduct by means of a pair of temporary eye-bars. The distance, center to center, of rope girders was about 1,700 feet. To each end was added 50 feet, to allow for wrapping, so that each of the twenty-four ropes was ordered 1,800 feet long from the Worcester plant of the American Steel & Wire Company.

To insure as uniform a rope as possible, the wire company decided to spin four ropes of 10,800 feet each, each of these four ropes to be cut up into six lengths of 1,800 feet each, thus making the twenty-four ropes. We cut test pieces 3 feet long from each end of each 10,800-foot length making eight test specimens. When the ropes carried only their own weight, the stress per rope was about 3,000 pounds, while under the weight of the entire eye-bar cable, the stress per rope was about 30,000 pounds. Each of the test pieces was socketed at each end and tested in the Emery hydraulic testing machine at Worcester, Mass., using an extensometer having a gage length of 10 inches and reading by dials to 0.0001 inch.

The results of these tests were plotted in the form of curves, and these curves were carefully studied. It was found that the average elongation at 30,000-pound load was practically the same under both the first and second application of the load, being about 0.1 inch in the gage length of 10 inches, or approximately 1 per cent. The elongation under the second application of the 3,000-pound load, that is, when the load was released from 35,000 pounds back to 3,000 pounds, was two or three times as great as the elongation under the first application of the 3,000-pound load. This proved that the elongation of the ropes when supporting the second eye-bar cable would be practically the same as when supporting the first eye-bar cable and that no extra provision need be made in the chain hoists as the sag of the rope under these conditions would be the same. The sag in the rope, however, after the first cable was swung, was considerably more than the sag when the ropes were first put up.

As a result of these tests, we were able to calculate the sag in the erection ropes under the various conditions of loading during the erection of both north and south eye-bar cables. As the erection ropes elongated under load, it was necessary to place on rollers the saddles which supported the ropes on top of the towers. The position and movements of these saddles were also calculated from the results of the rope tests.

No difficulty was experienced in the shop fabrication of the material. To insure easy erection, each main tower was assembled complete with columns, girders, struts and bracing in the yards of the Elmira plant of the American Bridge Company, and the field connections

TRAVELER PLACING FOURTH COLUMN SECTION OF CONTINENT TOWER

CREEPER TRAVELER USED TO ERECT UPPER SECTIONS OF TOWER

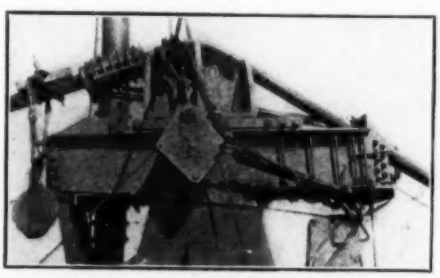
were reamed and match-marked.

Full-size tests were made on twelve typical eye-bars, all bars passing the elastic-limit and ultimate-strength requirements, and but one bar falling short of the necessary per cent of elongation. An additional full-size eye-bar test was made, and this passed the requirements successfully.

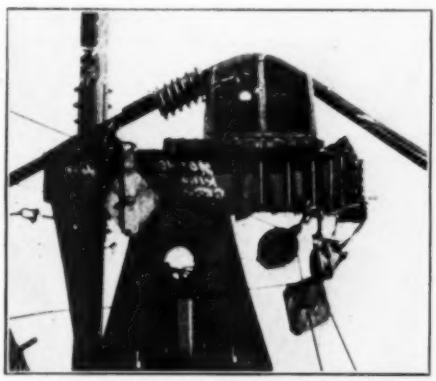
The anchorage steel, consisting of eye-bars and girders, was shipped in 1923 and erected by the general contractors, Byington and Sundstrom. Next, the concrete anchorages were built around the anchorage steel, leaving pockets in the concrete, about 3 feet square, surrounding the first panel of bars, so as to allow for eye-bar elongation under stress and to prevent the breaking of the adhesion of the concrete to the bars.

The remainder of the steel was sent from New York in three shipments, between June and October, 1924. This steel went by boat the 6,000 miles from New York to the northern end of the island of Santa Catharina. It was then transferred to lighters and transported down the strait to the material yard, which was located on the mainland at the end of the bridge. No difficulties were experienced in transportation, the entire 4,400 tons reaching the bridge site in excellent condition.

The field organization was selected with extreme care and was considered to be the best-equipped erection organization ever sent out on foreign work by the American Bridge Company. The first section of the steel forces left New York, July 5, 1924, arriving at Florianopolis about August 1, 1924. The entire scheme of erection was a complete departure from methods formerly used in suspension bridge construction, so that every precaution was taken to secure the successful erection of the structure. The organization, consisting of twenty-two Americans, comprised men who had previous experience in steel erection in Alaska, Mexico, Peru, Uruguay, Colombia, France, Africa, and the Australasian Islands. This American nucleus was expanded by the employment of native Brazilian labor, which did most of the handling of material in the yard.



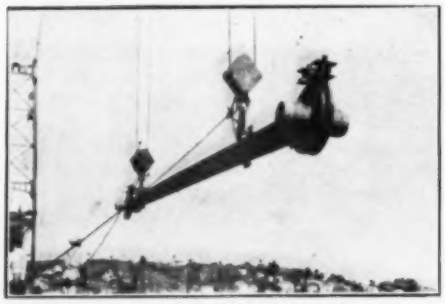
ROPE SADDLE OVER CENTER OF COLUMN WHEN ROPE CARRIED WEIGHT OF ALL EYE-BARS



ORIGINAL POSITION OF ROPE SADDLE PLACED IN ROLLERS 2 FEET 6 INCHES BACK OF COLUMN CENTER, WHEN THE ROPES WERE CARRYING THEIR OWN WEIGHT ONLY

The first viaduct tower was erected by a derrick on the ground and the remaining towers and spans were erected by a traveler operating on the viaduct floor level. The 185-foot spans adjacent to the main towers were erected on falsework, while each truss of the 110-foot spans was assembled complete on the ground and lifted into position as a unit. The continent and island viaducts were each erected in about three months' time.

The material for the continent and island towers was loaded from the material yard onto the lighter and brought to the foot of the respective main piers. The traveler standing at the front end of the 185-foot span erected the tower shoes, the first four sections of columns with the transverse girders, and the lower bracing. The upper part of the fourth column section was connected back to the U1 top-chord point of the 185-foot span to prevent the



RAISING A PAIR OF INNER BARS WITH PIN IN EACH END

rocker tower from falling over, until the eye-bar cables could be erected.

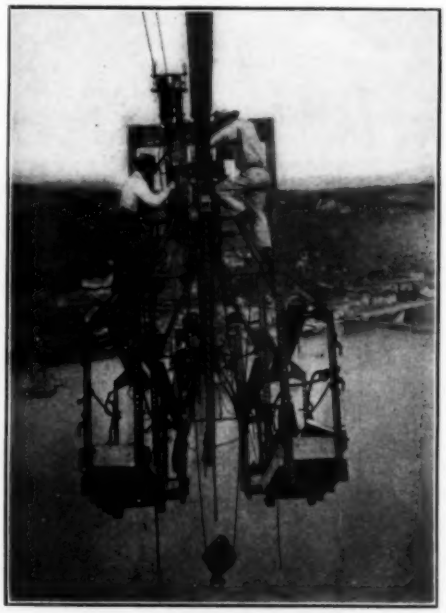
A special creeper traveler was then built around the columns, and this creeper traveler lifted the remaining six sections of the tower columns and the upper transverse bracing from the lighters, and raised these parts to their positions in the tower. This creeper traveler climbed the columns as each successive column section was placed. The continent tower was erected in six weeks, while the island tower erection consumed only five weeks.

The eye-bars from the continent anchorage X up to the viaduct level CA-6, as shown on the profile of the bridge, were erected on falsework attached to the viaduct. The same procedure was followed on the island side. Rope girders A and E, connected back to points CA-7 and IA-7, respectively, by temporary eye-bars shown dotted in the illustration, were placed on the north side of the viaduct. The rope saddles B and D on top of the towers were then placed on rollers, which rested on grillages temporarily attached to the tops of the north columns. These saddles were set back from the center of the columns the necessary distances to allow for the stretch of the erection ropes.

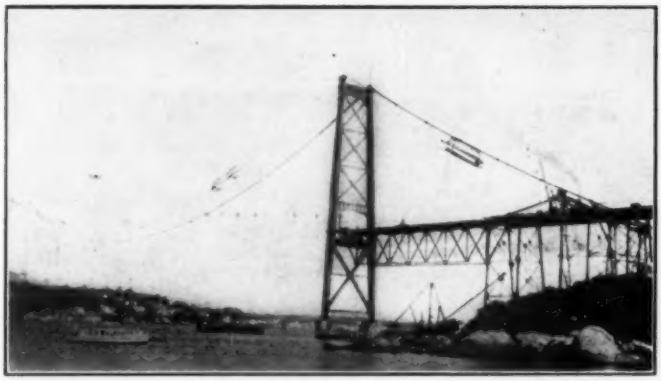
One of the ropes had been marked with wire wrappings at points A, B, C, D and E, in accordance with the distances determined from the sags and moduli of elasticity found under tests for various conditions of loading. This pilot rope was pulled over the tops of the towers and stretched until the marks A and E came opposite the pins in rope girders A and E. The ends of the rope were then wrapped one and a half times around the rope girder and fastened. The rope was then lifted on top of the towers and placed in the saddles in such position that marks B and D were at the centers of the saddle on top of the continent and island towers respectively. The mark C, midway between B and D, was then at the center of the span, and an observation was taken on this mark C to determine the actual sag of the pilot rope under its own weight and having at that time a stress of 3,000 pounds. The actual sag was between 86 and 87 feet, which closely checked the theoretical calculated sag of 87 feet.

The remaining twenty-three erection ropes were placed, making the sag of each the same as the sag of the pilot rope. Three trolleys were then erected on the ropes, one on each backstay AB and DE and one on the main-span portion of the ropes BD. The main-span trolley moved across the ropes from the island tower to the continent tower, clamping the twenty-four ropes together to form a single cable and placing the twenty-six chain hoists at the panel points. Each backstay trolley was meanwhile clamping the backstay portion of the twenty-four ropes together and placing the rod attachments for the eye-bars.

All the eye-bars for the main span, about sixteen bars at a time, were placed on the lighter, floated to a position under the erection ropes, and lifted into position by the main-span trolley. To avoid the necessity for driving the pins in mid-air, the two inner bars o alternate panels were assembled in the yard and pins placed in each end. In this way the bars were all slipped over the pins, reversing



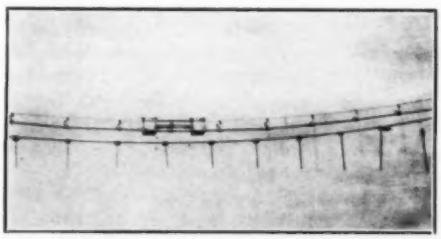
MAIN-SPAN TROLLEY



MAIN-SPAN TROLLEY PLACING EYE-BARS FOR MAIN CABLE ON SOUTH SIDE
The north eye-bar cable is shown already swung

the usual procedure and eliminating the platforms at each panel point which would be necessary were the pins driven through the eye-bar pin-holes. The pins at the top of the towers were driven through the eye-bars, but there we had the top transverse tower-struts to use as a working platform.

The first eye-bars lifted into position were at the center of the main span, this portion of

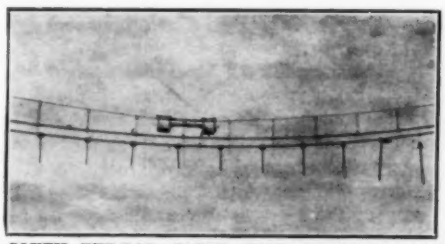


ERECTION OF SOUTH EYE-BAR CABLE, SHOWING CABLE STILL SUPPORTED FROM ERECTION ROPE
Note man standing at each panel point of eye-bars, ready to start releasing chain on hand-operated chain hoist.

the ropes being loaded to bring the rope saddles over the centers of the towers as soon as possible. When 25 per cent of the main-span eye-bars had been lifted into position and supported from the chain hoists, it was safe to proceed with the erection of the backstay eye-bars, because by that time the saddles had moved on the rollers nearer to the center of the columns. It was not possible for the saddles to roll off the columns forward, because the difference in length between the arc and the chord of the backstay ropes was only 2 to 3 inches. On the main-span portion of the ropes, however, the arc was about 20 feet greater than the chords so that it was possible for the saddles to roll off the towers backwards, if the backstay part of the ropes had been loaded with eye-bars without any counterbalancing eye-bars on the main-span portion of the ropes.

It took about ten days to erect the ropes, trolleys, clamps and chain hoists and two weeks to erect the 156 eye-bars in the north cable. The last eye-bar was placed on Saturday, March 7, 1925, and the actual sag of the ropes when carrying all the eye-bars measured 113 feet, as against the theoretical calculated sag of 115 feet. This difference is due to not placing the gusset plates and hangers as was originally intended when the calculations were made. The saddles at points B and D had moved over the centers of the columns.

After lunch, on March 7, 1925, men were stationed on the eye-bars at the chain hoists, the eye-bars being entirely supported by the ropes, and at a uniform distance of 6 feet below the ropes. At 2:30 P. M. the signal was given for all men to slacken off the chain hoists and in a few minutes the 6-foot gap began to widen. By 3:15 P. M. all 26 chain hoists were slack, indicating that the north eye-bar cable was swinging under its own weight and that the ropes were free of the bars. An observation showed that the actual sag of the ropes was between 99 and 100 feet, as against a theoretical calculated sag of 99 feet. The en-



SOUTH EYE-BAR CABLE JUST SWINGING AND SUPPORTING ITSELF

CONTINENT ANCHORAGE WITH BACKSTAY EYE-BARS

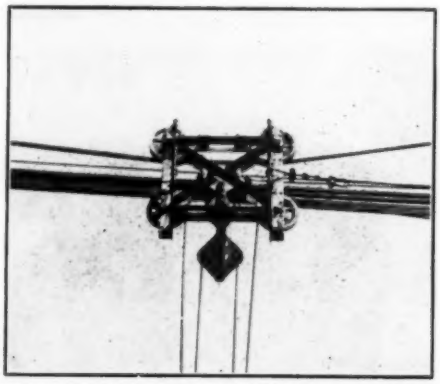
tire operation of swinging took only 45 minutes and was a complete success in every respect.

The main-span trolley then removed the chain hoists and clamps and at the same time placed the rope hangers and structural steel hangers. Simultaneously, the backstay trolleys removed the clamps and rod connections on those portions of the ropes. The next operation was to transfer the ropes from the north to the south side of the bridge in order to erect the south eye-bar cable. The ropes were first lifted out of the saddles and laid on the top transverse tower-struts, one at a time, the ends disconnected from the rope girders and temporarily fastened to the viaduct floor. The rope girders and temporary eye-bars at A and E were transferred to corresponding positions on the south side of the bridge, and the saddles, rollers and grillages on tops of the towers at B and D were transferred to the tops of the south columns. The twenty-four ropes were then refastened to the rope girders and replaced in the saddles in the same manner as before. The three trolleys were re-erected on the ropes and the rope clamps, rods and chain hoists placed as they had been for the north-cable erection.

The erection of the south eye-bar cable was carried out in the same manner as the erection of the north cable, and by April 2, 1925, the entire 156 eye-bars were supported from the ropes. The actual sag of the ropes was again 113 feet, the same as for the north cable, as against the theoretical calculated sag of 115 feet, but again the omission of the gusset plates and hangers accounted for the difference. This same distance of 113 feet in both cases checked up with the original tests of the rope specimens, which showed that the elongation of the ropes at the second application of the 30,000-pound load was practically the same as the elongation under the first application of the 30,000-pound load. As before, men were placed at the chain hoists and at 3:30 P. M. the signal was given to slack off. By 4 P. M. all chain hoists were slack and the south eye-bar cable was swinging free, the operation this time requiring only 30 minutes. The trolleys then removed clamps and chain hoists, the main-span trolley at the same time placing the rope hangers and structural steel hangers. The three trolleys were then taken down.

The operation of placing the twenty-four ropes, and the trolleys, clamps and chain hoists, for the north cable, took twelve days. The erection of the north cable, with 156 eye-bars, took two weeks. Placing the north hangers, removing the clamps, chain hoists and trolleys, transferring ropes, rope girders, saddles and grillages, re-erecting trolleys, and replacing clamps and chain hoists, took about two weeks. The erection of the south eye-bar cable, 156 eye-bars, took one week, just one-half of the time consumed during the erection of the north cable.

No portion of the approaches is supported



SMALL TROLLEY USED TO ERECT ONE THOUSAND MAIN-SPAN MEMBERS

from the cables. The sag of the main cables under full dead load was to be 120 feet. When the cables were swung under their own weight, only the sag of the cables was 116 feet, and at that time each tower was tilted back about one foot. The towers were therefore erected in this position when the tops of the fourth column sections were locked into the 185-foot span by temporary struts, and after the cables were swung these temporary struts were removed. As the main span was erected, the sag of the cables would increase from 116 feet to 120 feet and the towers would revolve about the base until they assumed a vertical position under full dead load. Before the stiffening truss was connected up, the entire weight of the bridge was supported by the eye-bar cables, which were flexible from tower to tower. The bridge was designed on the assumption that all of the dead load was to be carried by the cables, the stiffening truss being designed for live load and temperature only, and not to carry any dead load.

ERECTING TOP CHORDS OF THE NORTH TRUSS OF THE FLORIANOPOLIS BRIDGE

This view was taken looking through the span, and shows the bottom chords and diagonals of both trusses in place

Like the eye-bars, all the main-span material was brought out on a lighter under the cables and lifted into proper position on the bridge. The first two panels at each end of the main-span truss were erected by travelers standing on the viaduct at the main towers. When the traveler moved out under point 2 to place panels 3 and 4, point 2 of the cable moved down so much that top chord 2-4 of the stiffening truss could not be placed, thus bearing out the conclusions reached by a study from the equilibrium polygons. This contingency had been provided against, however, and the traveler was moved back on the viaduct and the remainder of the main span was erected by the overhead trolley method.

After the south eye-bar cable had been swung, the twenty-four erection ropes had remained temporarily over the south columns. Two of these ropes were now lifted from the saddles at B and D and placed on wheels resting on the top transverse tower-strut adjacent to the eye-bar cable shoe on top of the column. The ends of these two ropes were unfastened from the rope girders A and E and wound around the pins at the center of these rope girders, and a small trolley was placed on the two ropes. Another pair of ropes was lifted out of the saddles and placed on wheels on top of the transverse tower-struts near the north eye-bar cable, and another small trolley was placed on this pair of ropes.

These two trolleys, weighing only 5,000 pounds each, controlled by engines located on the viaduct at the main towers, erected the entire 1,000 members of the 54-panel main span —bottom chords, diagonals, top chords, floor beams, stringers, bottom laterals, sidewalk rackets, top laterals and top struts—with the exception of the two end panels at each end of the bridge. The bottom chords were first connected to the hangers, the diagonals were placed next, and then the top chords. In this way the load on the eye-bar cables was kept as uniform as possible. When all truss members were placed, the floor beams and bottom-floor laterals were erected followed by the stringers and top bracing. The main-span erection consumed 45 working days.

When all steel work had been placed, only about two-thirds of the entire dead load was on the cable and the sag of the cables, therefore, had not gone down to the proper distance of 120 feet. There was a delay in the delivery of the floor lumber, so, in order to drill the holes in the bottom chord gusset plates to connect the twenty-two diagonals between points 16, it became necessary to provide some temporary load to bring the sag down to the

proper amount. As there was plenty of sand along the beach on the continent shore, some of this sand was placed on the steel floor to provide for a load equal to 1,400 pounds per linear foot. Under this temporary load the sag was brought to 120 feet and the diagonals at each end, from point C to point 16, could be connected with practically no drifting. Using the holes in the diagonals between points 16 as templates, the 1,728 holes in the bottom-chord gusset plates were drilled and these diagonals then connected. All the gusset plates were one-half-inch thick and one of the erectors drilled 240 holes himself in one day of 8 working hours. The 50,000 field rivets in the main span were driven, the temporary sand load was removed, and the entire structure was given the field coats of paint.

The last contingent of our erection forces arrived in the United States on August 31, 1925, so that fourteen months elapsed from the time the first section of the field organization left this country until the last section returned. The actual working time at the site was just about one year, to erect the 4,400 tons of steel.

The wood floor was placed by the general contractors, Byington and Sundstrom, and completed during March, 1926. The official opening ceremonies took place on May 3, 1926.

Conclusion

The Florianopolis bridge is novel in four respects:

1. It is the first suspension bridge where a portion of the cable is integral with the top chord of the stiffening truss.

2. It is the first American suspension bridge that makes use of rocker towers.

3. It is the first bridge of any kind to utilize heat-treated eye-bars of the 75,000-pound-per-square-inch elastic-limit grade.

4. In the construction of this bridge the overhead method was used for the erection of the entire cables and main span, eliminating ordinary falsework and working platforms. Not one piece of falsework was placed in the channel from pier to pier.

In addition to the above special features, the bridge has the distinction of being the longest eye-bar cable suspension bridge in the world. It is a practical type of suspension bridge, because it has been completed with no unusual difficulties encountered in its construction. It is a safe bridge to construct, because the entire operations, covering practically a year, were accomplished in a foreign country, 6,000 miles from our own base, without any fatalities. It is an economic type of suspension bridge, because in competition with cables of wire and wire rope, the estimated cost of heat-treated eye-bar cables was lower than the estimated cost of wire cables or wire rope cables, and the actual cost of the bridge was inside of the estimate. The eye-bar cable suspension bridge is therefore a practical, a safe, and an economic type of suspension bridge.

A particularly gratifying feature, from an engineering standpoint, was the manner in which the actual movements of the erection ropes checked up with the calculations. But a more gratifying feature was the fact that this new type of bridge, with all its novel features, was successfully erected so far from home without the loss of a single human life.

ACKNOWLEDGMENT.—Prepared from a paper read before the Boston Society of Civil Engineers and also before the Harvard Engineering Society, New York City. A complete description of the design and construction of the Florianopolis Bridge, by Steinman and Grove, will appear in the publications of the American Society of Civil Engineers, early in 1927.

Material in Steel Columns Affects Strength More Than Changes in Type of Construction

ACCORDING to a recent report of the Bureau of Standards of the Department of Commerce, in Technologic Paper No. 328, tests recently completed of full-size steel columns show that under present specifications, differences in the physical properties of material entering into sturdy columns produce greater variations in the column strength than all the differences in type of construction. This work was conducted in co-operation with the American Bridge Company and the Bethlehem Steel Company. These firms furnished more than 150 tons of steel meeting specifications under which structural steel is usually purchased. This was fabricated into sixty-nine columns having H-shaped sections and of five different types of construction. The finished columns were tested to destruction in the 10,000,000-pound testing machine of the Bureau. Likewise, over 1,000 test specimens were cut from the columns and subjected to chemical analyses and physical tests to determine as accurately as possible the properties of the steel from which the columns were made. All of the material met the specifications under which it was furnished, but differed greatly in tensile yield point.

Although much work has already been done on column strength and design, these subjects are still under discussion.

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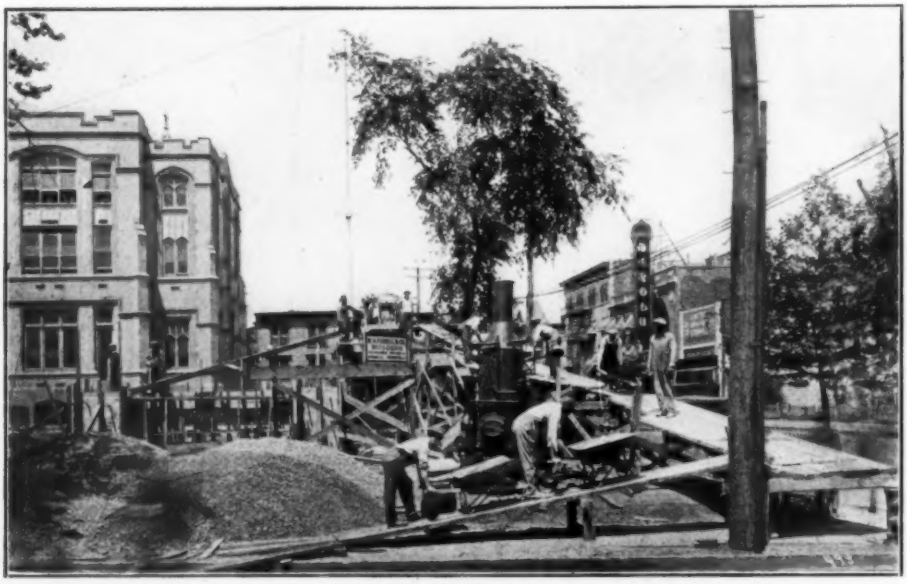
Equipment and Brains Make Saving in Concrete Handling



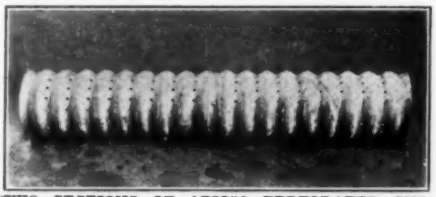
METHOD OF HANDLING CONCRETE IN THE CONSTRUCTION OF THE NEW ST. ROSE OF LIMA CHURCH, NEWARK, N. J.

W. H. Fissell Company, of New York, handled the concrete in a very interesting manner on this job on Orange Street, Newark, N. J. The Rex concrete mixer was placed on a scaffold about ten feet above the road or sidewalk grade. By using laborers to wheel the aggregate up the ramp to the mixer, the expense of running a hoisting engine was eliminated. The concrete was chuted into the foundation and walks, thus saving another expense for wheeling mixed concrete from the machine. This contractor used this same plan on a larger church job on South Orange Avenue, Newark. It will be noted in this photograph that the hoisting engine is on the job, but it was not used until the concrete walls were up six or eight feet above the sidewalk grade. We are indebted to C. H. Leomis & Sons Co., 304 Jelliff Ave., Newark, N. J., for the illustration and text. This organization sold the equipment to the contractor for this job

Perforated Iron Pipe for Subdrains

Drainage Efficiency Increased Through Use of New Type of Pipe

THE requirements of a successful subdrain are, first, that it have ample strength to sustain safely any load and impact which may properly be imposed upon it; second, that its nature be such that it maintain at all times a high capacity for drainage unimpaired by the separation of its units or by the admission of extraneous material, such as particles of soil or rock, and, third, that it have sufficient durability to give it a long service life, with a resulting economy of cost, and freedom from interference with operation because of renewals.



TWO SECTIONS OF ARMCO PERFORATED SUBDRAIN READY FOR INSTALLATION

To meet this situation, Armco perforated pipe was developed. This pipe is the regular Armco corrugated iron culvert pipe, which has been perforated in the valley of each corrugation for a portion of its periphery. This type of drain is installed in much the same manner as the corrugated iron culvert. Any desired length of continuous drain can be obtained by connecting succeeding sections with two easily adjusted hook bolts. While the pipe should have a good foundation, great care in preparation of the trench is not imperative as the pipe is self-aligning. By blocking the pipe up at intervals of about 20 feet, its grade line is established. Uniform bearing may then be provided by tamping filling material under the pipe throughout its length. A cover of broken stone to a depth of six inches or more above the top of the pipe and preferably to the top of the trench, would increase the porosity of the roadbed and the effectiveness of the drain.

The first advantage claimed for this type of drain is its ample strength, which supports any load that may normally be placed upon it. This strength is derived from the flexibility of the pipe. An advantage of equal importance with strength is that of drainage efficiency, which is the ability of the pipe to remove all water in the shortest possible time in any season, unimpaired by time or the conditions under which the drain must serve. Exhaustive field and laboratory tests have shown that it is a matter of but a few seconds between the application of water on the surface and its appearance in the Armco perforated pipe below. This is due to the fact that the valley of every corrugation is perforated, providing not occasional but many opportunities for the entrance of water into the pipe. The tight joints and comparatively small perforations prevent the admission into the pipe of foreign materials such as particles of soil or rock. The inseparability of its individual sections preserves the drainage efficiency of the pipe in spite of uncertain foundation or shifting soil. Armco perforated pipe has the same durability as Armco corrugated iron culverts.

Legal Notes

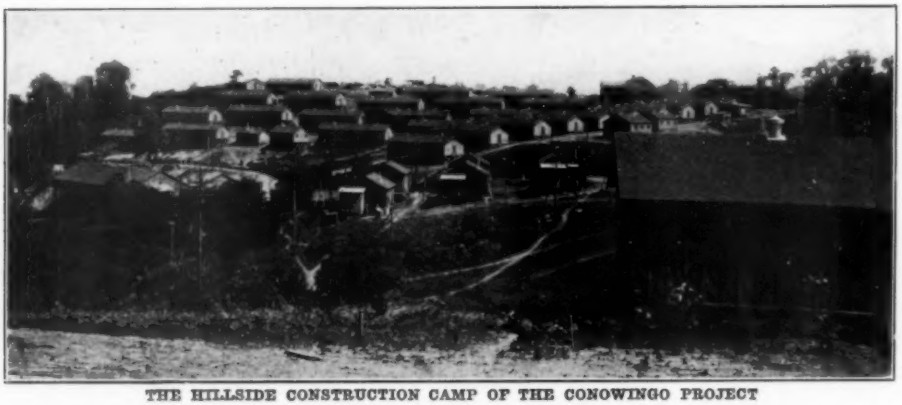
Effect of Retaining Check Tendered as "Full Payment"

A decision of considerable importance to contractors was handed down by the Texas Court of Civil Appeals in the case of Buford vs. Inge Construction Company, 279 South Western Reporter, 513. It pertains to the effect of accepting a check tendered as full payment of an account. Contrary to a very common misconception, the Court, in line with what most courts hold, decided that where there is no ground for dispute as to the amount due the payee of the check from the maker, the payee's acceptance of a check for a smaller amount will not preclude recovery of the balance actually due, despite its tender by the maker as full payment.

The theory of the law amounts to about this: If A builds a house for B under a contract calling for $10,000 as the price, and there is no reasonable ground on which B can avoid liability for that amount, there would be no legal consideration for A's implied promises to accept as full settlement a check for a smaller sum. But if A did extra work and there was no agreement as to what he was to be paid for that, B's insistence in good faith that he should not pay more than a certain sum and his tender of a check for that amount as full settlement, and its acceptance by A, would preclude further claim. Here, forbearing to litigate a bona fide dispute is treated as sufficient consideration to support a mutual understanding that a check shall be received in full payment.

Capacity in Which One Is Negligent Is Not Important

The bishop who excused a bit of profanity on the ground that he swore as an individual, not as a bishop, had nothing on the Georgia construction company which sought to avoid liability for injury to a pedestrian caused by a defective bridge temporarily constructed over a ditch in the street, on the ground that the company was a mere agent of the city in doing the work. The Georgia Court of Appeals decided that whether the company be regarded as independent contractor or mere agent it was liable if the accident resulted from its careless construction of the bridge. (City of Dawson vs. Carter, 132 Southeastern Reporter, 262.)



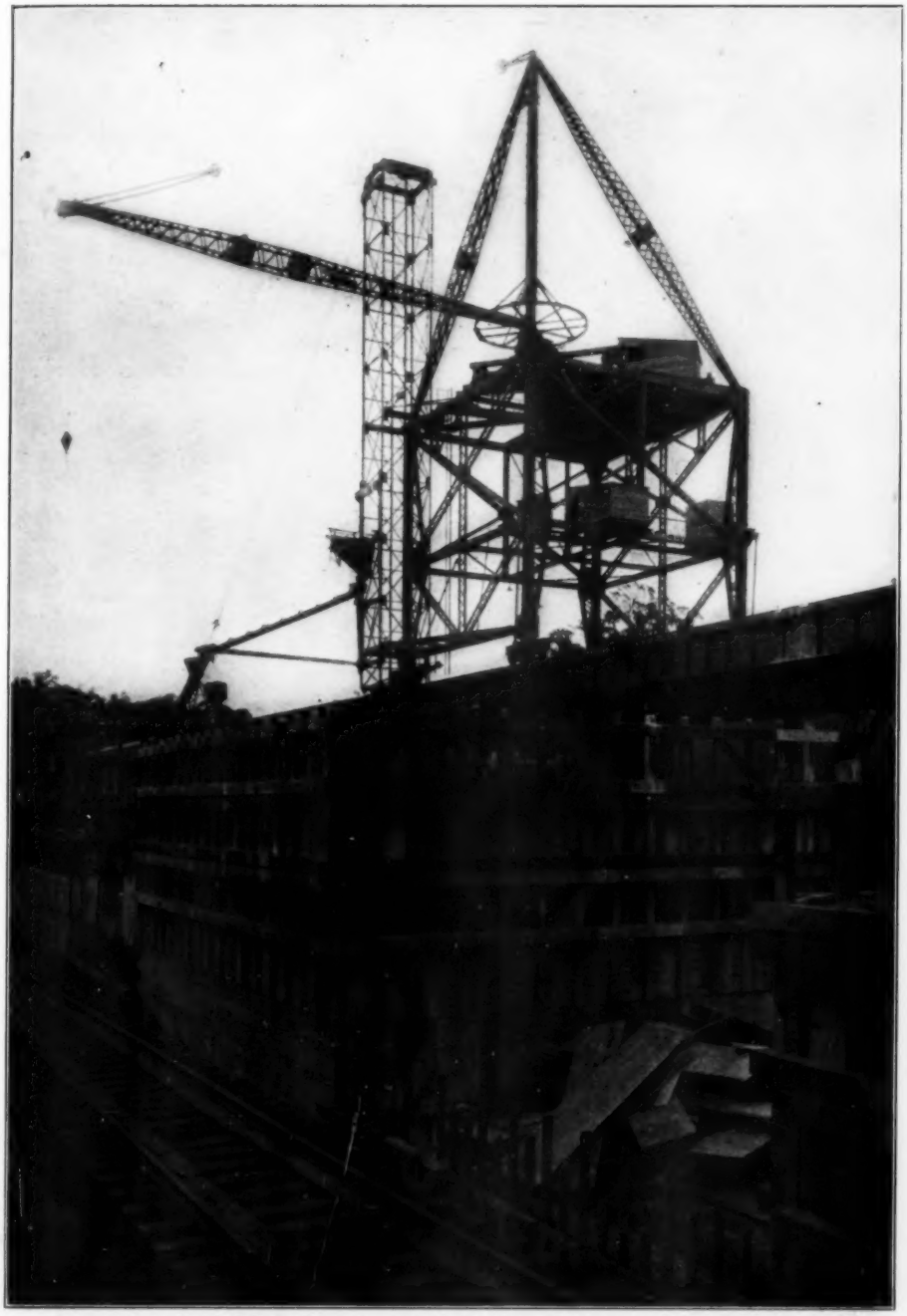
THE HILLSIDE CONSTRUCTION CAMP OF THE CONOWINGO PROJECT

Construction Methods Employed on the Conowingo Hydro Project

By A. W. CLARK
Works Manager, Stone & Webster, Inc., Conowingo Hydro-Electric Development

THE Conowingo hydro-electric project of the Philadelphia Electric Company when completed will be the largest single hydro-electric plant in the United States, save only that at Niagara. The initial output will be about 1,360,000,000 kilowatt hours per year. The plant is located within four miles of tide-water in the State of Maryland and the bottoms of the draft tubes are about eighteen feet below sea level. The Susquehanna River in the last 25 miles of its course, discharging into the head of Chesapeake Bay, drops about 150 feet through a well-defined gorge of granite about a mile wide. A plant which developed about 60 feet of this drop was built at McCall's Ferry (now called Holtwood) and completed in 1912. The output of this plant, about 500,000,000 kilowatt hours per annum, is transmitted

PHOTOGRAPH OF RIVER BOTTOM AFTER UNWATERING THE COFFERDAM, SHOWING THE CHARACTER OF BOULDERS ENCOUNTERED



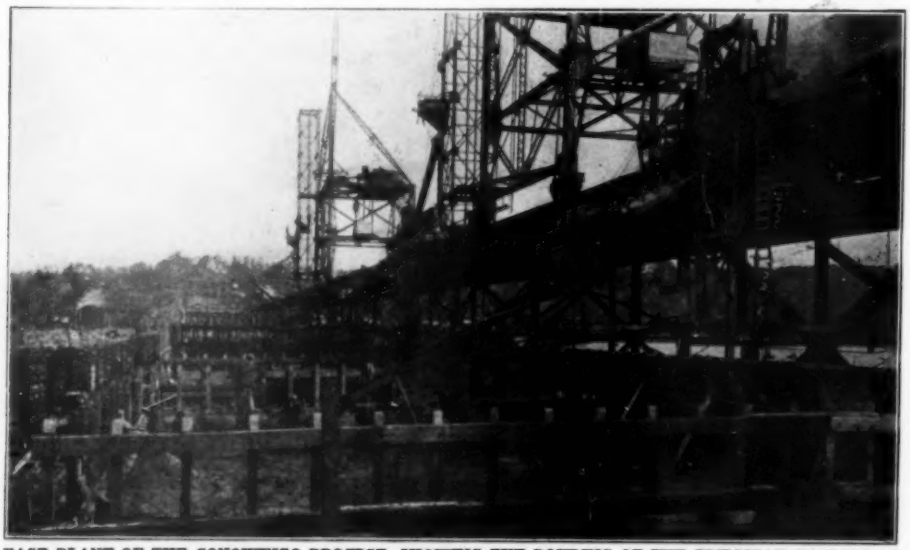
GANTRY TRAVELER ON CONSTRUCTION BRIDGE, EAST PLANT OF CONOWINGO PROJECT

THE EAST PLANT OF THE CONOWINGO PROJECT, SHOWING THE SAND AND GRAVEL CONVEYORS AND MIXING PLANT

to Baltimore, about 45 miles to the south. The Conowingo development, located about 15 miles below Holtwood, will back the water up to the tail-race of the latter plant, developing an average net head of about 89 feet. The physical conditions at Conowingo for the construction of this great hydro development are ideal. Test borings in the river bed at the dam site showed solid granite. The same rock makes an excellent stone for concrete and unlimited quantities of sand are also near by.

The dam, of which the power-house forms the westerly part, extends across the gorge about 4,800 feet in length. A highway bridge will be built across the top of the dam at a level of about 105 feet above the foundation. In the center of the dam, extending from the power-house wall 2,400 feet eastward, will be the spillway section. The spillway crest will be 86 feet above sea level and on top of this will be fifty movable steel gates 22½ feet high and 40 feet wide. By the manipulation of these gates the water level behind the dam will be maintained at 108½ feet above sea level. The discharge capacity of the spillway with all gates open will be about 880,000 cubic feet per second.

Along the west bank of the Susquehanna River at the site of the Conowingo hydro-electric development lies beautiful rolling farm country. The nearest railroad point is the small town of Conowingo on the Columbia and Port

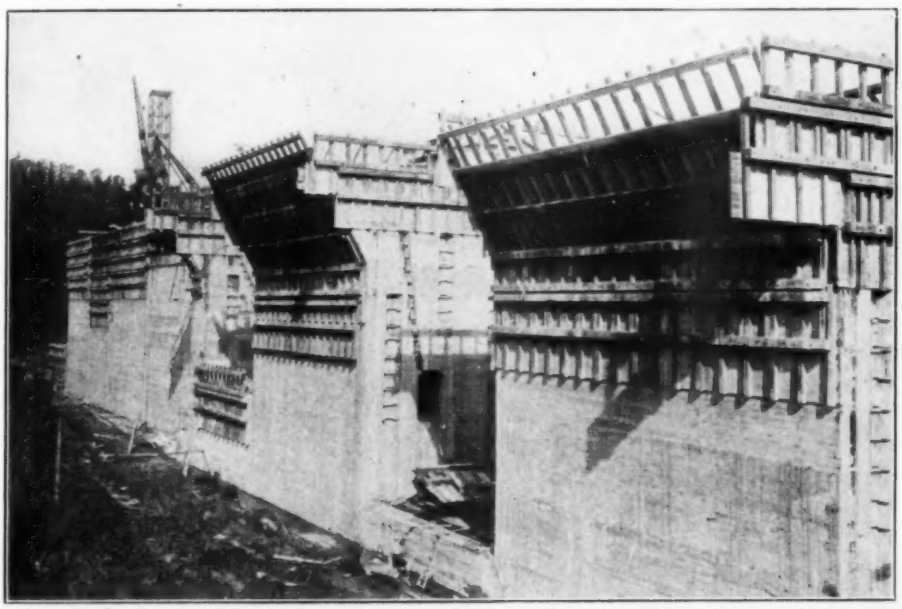


EAST PLANT OF THE CONOWINGO PROJECT, SHOWING THE POURING OF THE SPILLWAY SECTION OF THE DAM

Deposit Branch of the Pennsylvania Railroad on the east side of the river, which is reached by passing over a long and very old highway bridge in poor condition and capable of sustaining only a load of not more than five tons.

In attacking the work on the west side of the river, it was necessary to construct, at the earliest possible moment, a railroad for transporting the materials to the site. The railroad was constructed from Havre de Grace, on the Philadelphia, Wilmington and Baltimore Division of the Pennsylvania Railroad, ten miles up the west side of the river to the dam. The railroad consists of single track with an ample number of sidings. Eighty-five pound rail was used throughout and the road is ballasted with material secured from the waste bank of a stone-crushing plant through which the railroad passes. A classification and storage yard has been built on the line of this railroad about two miles down-stream from the work. In addition to hauling the freight necessary for construction, a few passenger trains are operated on a schedule planned to meet the working hours of the employees who reside south of the dam site and in the town of Havre de Grace. The movement of all trains is controlled over the telephone by a dispatcher located in a small office near the works.

Field work started on March 9, 1926. The first task consisted of the construction of a camp for the necessary labor, and for over two months, until the railroad was in operation, it was necessary to haul all material to the site by trucks and teams. This camp, with mess halls, a commissary store, and a hospital, has been constructed on the high ground adjacent to the west side of the river, and is capable of taking care of the needs of approximately 1,500 men. A limited number of two-room and five-room cottages have been built for the use of employees with families. The camp streets and all buildings are lighted with electricity, the current for both power and lighting being supplied from the Holtwood Plant of the Pennsylvania Water and Power Company over a transmission line from Delta, Pa., about twelve miles distant. The water-supply for the entire work is secured from the river, the domestic supply being filtered, chlorinated and pumped to a 100,000-gallon steel tank and from there distributed through pipe lines. A sewerage system is provided, with necessary septic tanks, the effluent of which is chlorinated before it is discharged into the river.



THE EAST PLANT, SHOWING THE SPILLWAY SECTION OF THE DAM FROM THE UP-STREAM SIDE AND THE METHOD OF POURING ALTERNATE SECTIONS

The area of the river covered by the powerhouse and tail-race has been divided into two sections, first enclosing with a cofferdam the section containing the head-works, powerhouse, and a portion of the tail-race. While

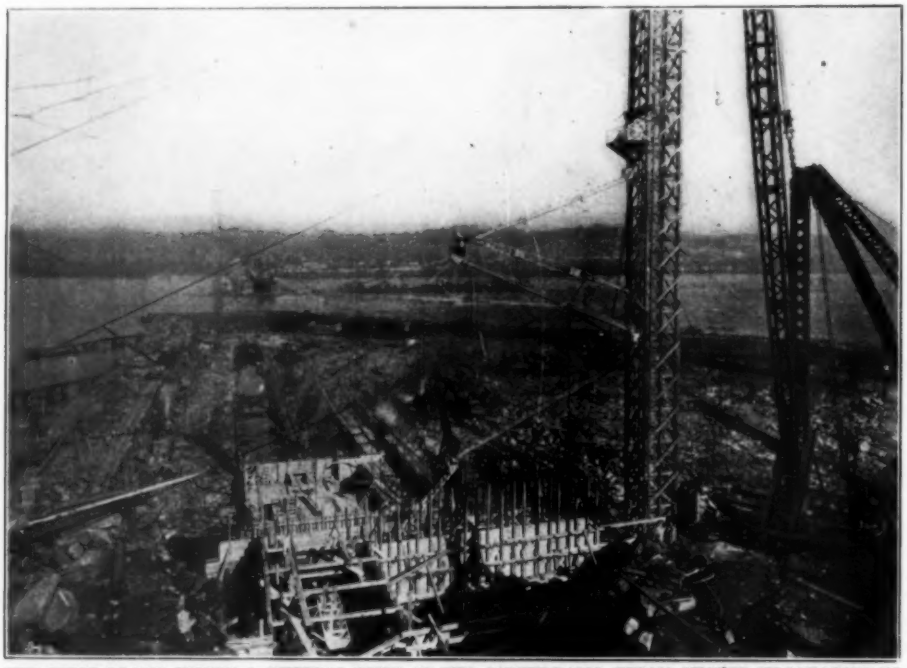
excavation was under way in that section, the construction of the cofferdam enclosing the remainder of the tail-race was able to proceed. The first section has been enclosed, was unwatered during the last week of July, 1926, and excavations are now proceeding.

The cofferdam consists of a double row of rock-filled timber box cribs, separated by a sheathed puddle-chamber approximately 10 feet wide. The cribs are tied together across the tops of the puddle chamber with 10 x 12-inch timbers securely bolted to the timbers of the cribs. The timber used consisted of commercial lengths of 10 x 12-inch Southern pine and Douglas fir. The sheathing of the clay chamber consists of a double course of 2 x 10-inch planks with lapped joints.

The cribs were built in place, carefully fitted to the bed of the river with the bottom bearing members placed lengthwise in the direction of pressure. Timbers for the cribs were handled by cranes on crawlers which traveled on top of completed cribs, and these cranes were supplied with material from cars on standard-gage tracks which followed the cranes closely. These tracks were also used for supplying the rock fill and clay puddle which were transported and dumped from 6-yard and 12-yard two-way dump-cars.

In order to give an idea of the amount of work involved in constructing the first section of the cofferdam, which encloses the head-works, power-house and a portion of the tail-race, the following quantities are given: Lineal feet of cofferdam, 2575; 5,600,000 board feet of timber; 69,000 cubic yards of rock fill; 32,000 cubic yards of clay; area enclosed, 14.7 acres.

The second section of cofferdam, which is to enclose the remaining area covered by the tail-race, is now under construction and when completed will contain the following quantities: Lineal feet of cofferdam, 2,220; 2,700,000 board feet of timber; 24,000 cubic yards of rock fill; 13,200 cubic yards of clay; enclosed area, 11.1 acres.



THE WEST PLANT GIVING A GENERAL VIEW OF THE COFFERDAMS, STEAM SHOVEL EXCAVATION IN THE RIVER-BED, CONCRETE TOWERS, AND FORMS FOR THE RETAINING WALL, WEST ABUTMENT

The excavation of approximately 100,000 cubic yards of rock for head-works and power-house is to be carried down to several different elevations, the deepest and most difficult being in the area containing draft tubes. This consists in cutting a gash in the river-bed approximately 550 feet long, 80 feet wide and 30 feet deep, with the up-stream side vertical and the

THE WEST CONCRETE MIXING PLANT, SHOWING THE SAND AND GRAVEL STORAGE TRESTLE AND CONVEYOR

down-stream side sloping up in the tail-race on a 1 to 6 slope. For this particular work, a high-lift full-revolving steam shovel on crawlers, with a 2½-yard bucket, was selected, in order to minimize the number of track changes and also to enable us to remove a large quantity of material with the hauling tracks on the bed of the river or the top of the cut. To handle the 180,000 cubic yards of rock excavation for the tail-race, a 3-cubic yard steam shovel on railroad trucks is employed where lifts are low, together with two small revolving shovels on crawlers for odds and ends. All this equipment is served with six 12-cubic-yard two-way dump-cars hauled by steam locomotives on a standard-gage track system with a lead to a double-track trestle on a 2.5 per cent ascending grade running parallel to the down-stream leg of the cofferdam. Excavated material is hauled to its destination by means of this track system.

THE WEST PLANT OF THE CONOWINGO PROJECT, SHOWING CONCRETE MIXING PLANT AND CEMENT SILOS

Drilling of the rock is accomplished by air drills, for which air is supplied from four 800-cubic foot air-compressors located on the side of the hill, well above any possible flood level.

The rock in the excavations for both the power-house and tail-race is principally gneiss and is of excellent quality for concrete purposes. A crushing plant has been installed and is now in operation. The rock is carried from the tertiary crushers on a belt-conveyor to a 25,000-cubic-yard storage pile. Under the pile, at sufficient intervals, there are storage bins for delivering the crushed stone to a belt-conveyor operating in a 6 x 6-foot reclamation tunnel under the entire length of the pile and then up an incline to the stone bins over the concrete mixing plant. Around the bin gates are steam coils to deliver live steam to the material in winter.

Sand will be delivered to the job in standard hopper-bottom cars hauled over the construction tunnel from Havre de Grace, and will be dumped from a trestle to a storage pile, under which there is a 6 x 6-foot tunnel, with conveying equipment similar to that used for the stone, for carrying sand to the mixing plant.

The concrete-mixing equipment consists of two 2-cubic-yard motor-driven mixers supplied with aggregates delivered into the mixers from batchers and inundators which are filled from overhead bins. The proper proportion of cement is determined by weight. Bulk cement is used, which is stored in wood silos filled by means of bucket elevators operating from the track level on the ground. Wherever it was feasible, steel supports were used in the construction of the concrete plant in order to reduce the fire hazard.

From the mixing plant, concrete is to be hauled by 8-ton gasoline locomotives, in 2-cubic-yard standard-gage specially designed tilting cars of the Easton "Rollover" type, to four wooden towers approximately 220 feet high, supplying the forms through the necessary chuting equipment.

For repairs to construction equipment and for supplying the various shop needs necessary on this class of work, a shop group has been established at the nearest available space to the work about a half-mile down-stream from the dam. A machine shop, a blacksmith's shop, a pipe shop, and repair pits, equipped with an air-hammer, lathes, grinders, drill presses and other machine tools for the handling of such work, have been built. As far as possible, there has been purchased for these shops equipment which can be installed in the permanent shops to be built and equipped for the use of the operating forces after the project is completed. At this location, there is also being constructed a carpenter shop, in which will be installed the necessary wood-working machinery to facilitate the construction of forms. Space has been reserved for lumber storage adjacent to this shop.

Space has also been reserved in this vicinity for the storage of reinforcing steel, and here a power shear and power bender have been installed for the fabrication of reinforcing steel. All these shops and the steel yard are served with standard-gage tracks which connect with the construction railroad and the track system throughout the work.

The power station is designed to be built of structural steel and concrete. It is our purpose to arrange the work so that the concrete necessary to support the steel structure will be placed as early as possible, in order that the structural steel can be handled and traveling cranes put in operation to handle the heavy loads necessary in placing the equipment while the building is being enclosed.

ACKNOWLEDGMENT.—From a paper read before the American Society of Civil Engineers, at Philadelphia, Pa., October, 1926, and from the Stone & Webster *Journal*. Photographs, courtesy of Wm. C. L. Eglin, Vice-President and Chief Engineer, The Susquehanna Power Company, Philadelphia, Pa.

Notes of Interest

Southern Clay Products Association Organized

ON November 9, at Macon, Ga., the Southern Clay Products Association was organized. The announced purpose of the Association is to "educate the public in the great advantages of burned-clay products as building materials and thereby increase their use."

Clarence Seavers has been appointed Executive Secretary, with headquarters in Macon. The other officers of the Assocation are: President, W. E. Dunwody, President, Standard Brick and Tile Company, Macon, Ga.; First Vice-President, J. L. Hankinson, Georgia-Carolina Brick Company, Augusta, Ga; Second Vice-President, C. W. Dixon, Gamble & Stockton Company, Jacksonville, Fla.; Treasurer, A. H. Merry, Merry Brothers, Augusta, Ga.

The Fallacy of Unnecessary Strength

THE National Lime Association, 927 Fifteenth Street, N.W., Washington, D. C., has prepared a sixteen-page bulletin in which it aims to show, by illustrations, statistics and text, the wasteful extravagance of using good materials in the wrong places, taking mortars as the basis of the discussion. The savings made possible by the use of lime-mortar are shown.

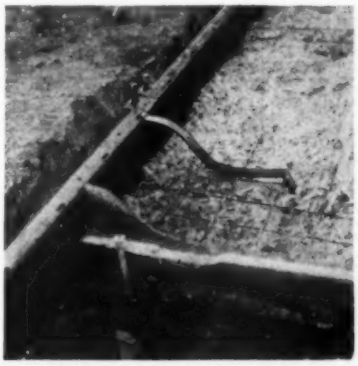
Building Curbs Without Face-Forms

Chicago Contractors Develop Unique Method

AN exceptionally simple and efficient method of constructing integral curb was developed this last season by contractors in the Chicago district. In the smaller communities in that area a low, flat curb has recently become popular. A typical curb of this sort would have a 2-inch flat top, a base width of 10 or 12 inches, and a height of 4 or 5 inches, leaving the face with so little batter that no face-form is needed.

The face is usually given a reverse curve which meets the flat curb top at one end and the pavement crown at the other. This face is secured with a straightedge which rests on strapped iron girders.

The back-forms are set up to the height of the curb and the tops of these forms are slotted at 10-inch intervals. Into each of these slots is hooked one end of a piece of strap iron which has been bent to the shape of the face of the curb. The other end of the strap iron is driven into the ground to hold it rigid.



STRAP IRONS, BENT TO THE SHAPE OF THE CURB, ARE HOOKED TO THE FORMS AND DRIVEN INTO THE SUBGRADE

THE CURB IS STRUCK OFF WITH A STRAIGHT-EDGE WHICH RESTS ON THE STRAP IRON GUIDES

Except in the area which the curb will occupy, the pavement is struck off with a hand template which rests on the side-forms. Enough concrete to make the curb is deposited against the forms by the mixer or by the concrete spreaders where it is left by the srike-off template. This concrete is then struck off with a straightedge whose ends rest on the strap-iron guides and the strap iron taken out. The curb is finished with a wooden hand-float and brush. This method requires no face-forms and the concrete for the curb does not have to be carried back in wheelbarrows or shovels.

Savings to Contractors by the Quantity Survey

The Experience of One Bureau in This Field

OF late quite a number of periodicals and leading news publications have been harping on the new profession in the building game, known as building quantity surveying. We have been investigating this field and have succeeded in obtaining some minute testimonials of the value of this work. We cannot go into a very lengthy discussion here, but will cite one particular instance which was brought to our notice in connection with the Chicago Union Station.

This job came up for figures in 1919, and the final survey on which the job was let was taken in 1923—four years from the time the plans first came out. One can appreciate that on a job of this size there would be many changes. Several times these changes necessitated a complete new survey for each contractor on the job. By actual statistics it was determined that the total time of making the surveys on interior stone, marble and terrazzo by a single individual was 154 days—nearly half a year's time on an interior job where the contract did not exceed one million dollars on the three branches just mentioned.

There were twelve competitors the first time this job came up for figures. With constant revisions the number of competitors decreased to three, making an average of eight competitors. If each contractor had his individual estimator take off the job, there would have been a total of 1,232 days or over three years spent on the estimating

of this one project. Compare this with the actual 154 days spent surveying this project by a centralized quantity survey bureau and you find a saving of 1,078 days is effected. At $10.00 a day, $10,780.00 is saved by the eight contractors.

Contractors and the building public are ignorant of the actual cost of estimating proposed building projects. Ten may figure a job, but only one man gets the contract when the job finally goes ahead. This item of overhead for the contractor runs into millions of dollars every year, and contractors have no way of collecting individually on this item of overhead. Hence the cost must actually fall back on the man who builds.

If building quantity surveying can save $10,000 on one job, what could it save the contractors of the United States if it were more extensively used?

Building quantity surveying is becoming quite popular in a number of branches in the building industry, and also in the general contracting field, as can be proved by the Burman Bureau, Chicago, which reports over 5,000 projects passing through its offices since its establishment in 1917.

The Burman Bureau has now opened a branch office in New York City, at 103 Park Avenue, from which office it will begin by serving the marble industry and will in time take on additional branches. This bureau's method has always been to specialize in the various branches, in that way giving the trades expert services on quantity take-off at very reasonable cost. These quantities are then mailed to the contractors upon their request, no quantities being sent out without a specific order for each project, and the only work that remains for the contractor to do is to price, check, and send in his bid. In this way the valuable time of the subcontractor is saved. In large cities where general contractors provide subcontractors' estimating rooms at a high rent, this expense could be done away with and a big saving made by general contractors. These public estimating rooms do not create a healthy condition; too many men are allowed the use of plans at the same time.

That building quantity survey bureaus will prove economical and much safer than present methods is very certain.

A Comparison of Workmen's Compensation Laws

From Monthly Labor Review, Bureau of Labor Statistics

IT is generally recognized that workmen's compensation laws, with their principle of fixed benefits for industrial injuries, disregarding the question of fault or negligence, contributory or otherwise, are established in the jurisprudence of this country. However, almost numberless possibilities for variation exist in the different provisions of the laws, and the legislatures continue, without present prospect of cessation, to alter, in more or less important degrees, the provisions of existing laws.

The United States Bureau of Labor Statistics has at various times undertaken to present the salient features of the different acts in chart form for the purpose of ready comparison. Such a chart was prepared to accompany a study of the laws as they existed at the end of the year 1919. A revision recently made presents data as of the end of the year 1924, scores of changes in the items noted in the chart having been made in the intervening years. The amendments are in the main in the direction of liberality, the percentage of wages payable as benefits being advanced, the number of employees required to secure coverage reduced, the waiting time shortened, medical benefits liberalized, etc. Administrative changes also seek to shorten the time for arriving at decisions and to safeguard the rights of workmen in respect to improper settlement or dilatory procedure.

The late revision of charts noted above appears, in connection with a brief summary, as Bulletin No. 379 of the Bureau of Labor Statistics. The laws of forty-two states, of the territories of Alaska and Hawaii, of the island possession Porto Rico, and the Federal statute applicable to civilian employees of the United States are summarized herein. The last law is applicable also to the employees of the District of Columbia, though compensated from District and not from Federal funds. This leaves the workers of six states (Arkansas, Florida, Mississippi, Missouri, North Carolina, and South Carolina) and private employees in the District of Columbia without the benefits of any compensation legislation. Railroad employees in interstate commerce and maritime workers are similarly subject to laws providing for liability only. The applicability of the law depends on the choice of the employer in thirty-one states, though in most of these election is presumed. Ten, however, require positive action. An employee may also act by way of election, but only in Kentucky is it necessary for him to act if he wishes to accept the provisions of the law accepted by the employer; in New Hampshire he may make a choice between a liability suit and compensation after the injury has been received.

In fourteen states there is no option, the law being compulsory, except that in Arizona; though the employer must come under the act,

the employee may choose a damage suit instead of compensation benefits. Employers are required to insure their liability to make compensation payments in all jurisdictions except Alabama, Alaska, Arizona, and Kansas. In eighteen states the state provides an insurance system, eight of these being exclusive of any stock or mutual activity, while in ten states competition is allowed. In Tennessee the state fund applies only to coal mining, the system being competitive.

No law covers all industries or employments, unless that of New Jersey be excepted. Agriculture and domestic service are practically universally left out, though elective provisions are made for them in some states. In twelve states the law applies only to what are classed as "hazardous" or "extra hazardous" employments. These employments are enumerated in some laws, and in others the determination is left to the courts and commissions. In twenty-one states employers of less than a stipulated number of employees are exempt from the operation of the laws. In Alabama an employer must have 16 employees to make the law applicable; in Vermont and Virginia, 11; in Georgia, 10; in Maine and Rhode Island, 6; while other states require 5, 4, 3, or at least 2. There may be in this numerical test a recognition of the danger accruing where larger numbers of workers are brought together, or the thought that only the less hazardous undertakings could be carried on with small numbers of workmen. The provision is in interesting contrast to the old idea that the employee assumed the risk of injury due to the carelessness of a fellow workman, no matter how numerous, remote, or impossible of control by the injured man such workmen might be. Employees in the service of the state and its subdivisions and municipalities are included generally in twenty-five states.

The old idea of accidental injury, so prominent in liability law, still predominates in the compensation field, though it is indisputable that many injuries which lack the suddenness of development or the specific basis of causation that characterizes accidents are as purely due to the employment as are these. Occupational diseases may be compensated under the laws of twelve states, most of these having been changed in very recent years to make such inclusion possible. The Federal statute for 1916 covers any "injury," the term including any "disease proximately caused by the employment." General terms are used in a few of the laws, but in several only a designated list can be compensated.

Waiting time varies, being two weeks in five states, ten days in five, and one week in twenty-eight, with no waiting time in three jurisdictions. Four states require three days and one five days of disability before any compensation can be paid.

Practically every state—Washington and Wyoming being the only exceptions—base compensation payments on the wages of the injured worker. In eleven states and under the Federal statute the rate is 66⅔ per cent, four others using 65 per cent as a base. In eight the rate is 60 per cent, in three, 55 per cent and in seventeen, 50 per cent, though in several of these the amount may be increased according to the number of dependents—to 60 per cent in Alabama, 65 per cent in Illinois, and 66⅔ per cent in Oregon. Payments are limited in term in a majority of the states, death benefits continuing until death or remarriage of the widow in but seven, and under the Federal law; while in eighteen states and under the Federal statute permanent total disability may be compensated throughout life. In other states death benefits range from 260 weeks in Vermont and 285 weeks in Delaware to 416 weeks in Maryland and Ohio and 500 in Massachusetts. A limit of 300 weeks is found in several states. For permanent total disability Vermont offers the shortest period, 260 weeks, the next shortest term being 300 weeks in New Hampshire, while Connecticut pays for 520, Alabama and Tennessee for 550 and Wisconsin for 900 weeks. Eight states pay for 500 weeks.

Other limitations qualify the actual benefits payable, the total amount for permanent total disability being fixed at $3,000 in South Dakota, $4,000 in Arizona, Delaware, Massachusetts and Vermont, and $5,000 in eight states, though in some of these the term for permanent total disability is life. The amount in Minnesota is $10,000, but if the payments were made at the maximum allowed rate of $20 per week this amount would be exhausted in 500 weeks, a term that is equaled in several states, though a lower total is prescribed. The maximum amount payable weekly is also a restriction on the possible benefits which the wage percentages suggest, six states having a maximum of $12 for temporary total disability, while but nine permit amounts above $18 per week.

The practical economy of thorough and adequate medical treatment is increasingly recognized, though in a number of states both period and amount of medical treatment are restricted to such an extent as to prevent the most beneficial results in the more serious cases. In twelve laws the amount available is fixed at

$100, though in a few cases the discretion of the commission may be exercised to increase the amounts; while four laws create no liability for such assistance beyond two weeks. In nine states and under the Federal law neither time nor amount is limited, while eight states limit the amount but not the time, and nine the time but not the amount. In some of these also time or amount or both may be increased in the discretion of the commission, so that but nine laws restrict both items absolutely, and all but two (those of Alaska and Arizona) provide medical benefits in some amount.

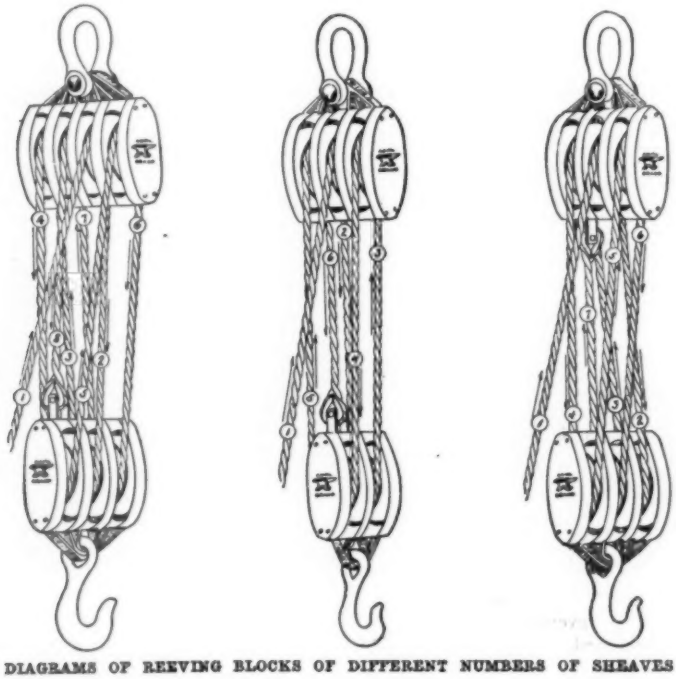
Non-resident alien dependents are subject to discriminatory treatment under the laws of twenty-seven states. They are entirely excluded in four, reduced benefits are allowed in fifteen, reduced commutations to lump sums in three, while the classes of possible beneficiaries are restricted in ten; the presumption of dependency allowed in the case of resident relatives is denied non-resident claimants under the California law. In eight states non-resident aliens are placed on the same footing as residents, while in ten they are not mentioned; in three of this latter group they have been included by administrative or court action, as is the case with the Federal employees' statute.

The Reeving of Tackle Blocks

Helpful Information Furnished by Manufacturer

IN reeving a pair of tackle blocks one or both of which has more than two sheaves, the hoisting rope, whether manila or wire, should lead from one of the center sheaves of the upper block. When so reeved, the hoisting strain comes on the center of the blocks and they are prevented from toppling, with consequent injury to the rope, by cutting across the edges of the block shell. In order to reeve by this method, the two blocks should be placed so that the sheaves in the upper blocks are at right angles to those in the lower block, as may be seen in the illustrations. These illustrations show the reeving of blocks of difdifferent numbers of sheaves and the numerals indicate the path of the rope through the sheaves of the two blocks.

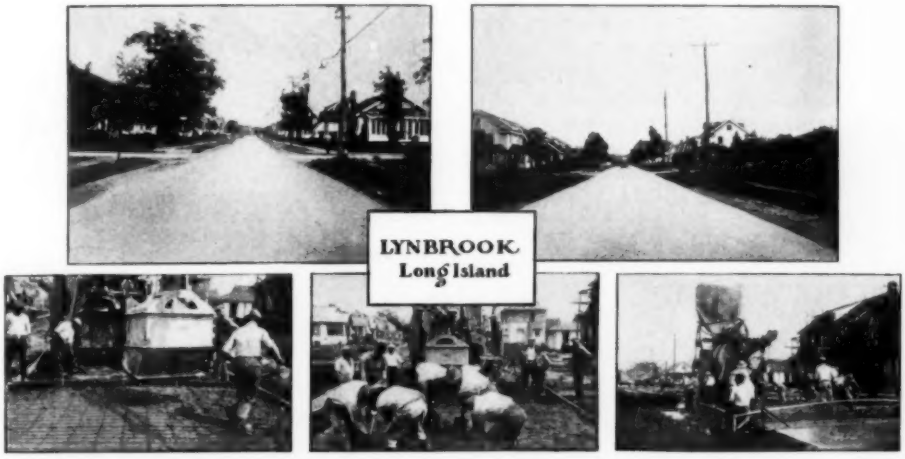
We are indebted to the Western Block Company, Lockport, N. Y., for the illustrations and this information, which we are pleased to pass on to our readers.



DIAGRAMS OF REEVING BLOCKS OF DIFFERENT NUMBERS OF SHEAVES

American Steel & Wire Company's WIRE FABRIC

"The Steel Backbone for Concrete"



20 Miles of Wire Fabric Reinforced Concrete Streets in 4 years

GOOD looking permanent paved streets radiate from every business corner of Lynbrook, Long Island—a progressive village of 10,000 people near New York City.

Four years ago, the village appropriated its first money for a permanent paving program. Today there are 20 miles of wire fabric reinforced streets in this village.

The village board can definitelv tell you that over a half million dollars has been wisely invested. Last year many new homes were erected. Values have greatly increased. Hundreds of new families have been attracted to the village of good roads.

The public at large wants more and better roads—permanent wire fabric reinforced roads! The saving in maintenance costs appeals to them! The assurance of complete protection against cracks and breakage has a real sales appeal and stimulates communities to foster comprehensive good road programs.

The experience of this organization is at your service. Let us give you the facts about Wire Fabric Reinforcement.

SALES OFFICES

CHICAGO 208 So. La Salle Street
CLEVELAND Rockefeller Building
DETROIT Foot of First Street
CINCINNATI Union Trust Building
MINNEAPOLIS—ST. PAUL Metropolitan Nat'l Bk. Bldg., St. Paul
ST. LOUIS 504 Olive Street
KANSAS CITY 417 Grand Avenue
OKLAHOMA CITY First Nat'l Bank Bldg.
BIRMINGHAM Brown-Marx Bldg.
MEMPHIS Union and Planters Bank Bldg.
NEW YORK 30 Church Street
BOSTON 185 Franklin Street
PITTSBURGH Frick Building
PHILADELPHIA Widener Building
ATLANTA 101 Marietta Street
WORCESTER 94 Grove Street
BALTIMORE 32 So. Charles Street
BUFFALO 679 Ellicott Street
WILKES-BARRE Miners Bk. Bldg.
DALLAS . . . . . Praetorian Bldg.
DENVER . . First National Bank Bldg.
SALT LAKE CITY . Walker Bk. Bldg.

UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle

Pipes Frozen In---Tractor Pulls Them Out

Milwaukee Contractor Solves Problem Economically

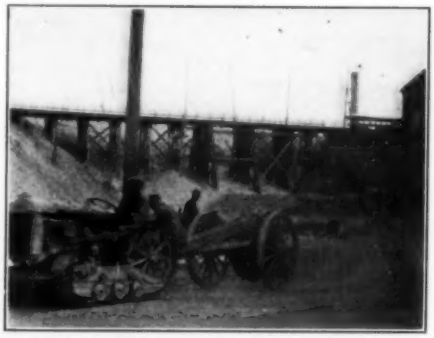
WORKING on a time limit, with weather and ground conditions seeming to conspire against him and his profits, Herman Hohensee, contractor, at Milwaukee, Wis., hit upon the idea of equipping his Fordson with crawler tracks, and therewith pulled his pipes out of the mud where they had sunk and been frozen in. He saved hundreds of dollars, for he was able to fulfill his contract within the time limit.

Mr. Hohensee, who had a sewer job in South Milwuakee, Wis., had bought his pipes in the late fall and had dumped them into a vacant lot about one-half mile from the job, until such time as he would be ready for them. This happened to be not until the following spring, and when he then needed the pipes, he found them sunk and frozen deep into the ground. The pipes, which were 12 feet long and 36 inches inside diameter, weighed 3,600 pounds each.

The contractor had found out too late that the convenient vacant lot was full of spring-filled mud holes, so soft that one morning on arriving there he found his Fordson had sunk three feet, and actually had to dig it out.

The time limit was drawing near, and Mr. Hohensee had to get the pipes out of the ground and over to the scene of action. He could not use a derrick, because his problem was as much that of getting the pipes to the job as of getting them out of the ground. A derrick, too, would have badly crushed the sidewalk and curbstone.

After trying a skid, which did not stand up because of the heavy pressure of the pipe, Mr. Hohensee finally rigged up a dolly which, pulled by his old Fordson equipped with new Trackson Full-Crawlers, did the trick.



TRACTOR WITH DOLLY, HAULING 2600-POUND SEWER PIPE WHICH THE MACHINE PULLED OUT OF THE FROZEN GROUND

The illustration shows the dolly with a slanting pole and two big wheels. The contractor tipped down the rear end of the pole and slung the chain around the pipe back of the lip end, lifting it to about three inches above the ground, and so pulled the pipes out of the hard ground, through the mud, to where they were needed.

In this job the Trackson-Fordson pulled almost as much as its own weight through mud and gravel, where a wheel tractor could not have done the work, handling 3,600-pound pipes which four horses could not have pulled through the deep mud.

Progress Toward a Uniform Mechanics' Lien Act

A COMMITTEE of thirteen men appointed by Secretary of Commerce Herbert Hoover to draw up a mechanics' lien act that will serve as a basis for more uniform state legislation on this subject, recently sent out copies of its first tentative draft to several hundred trade associations, labor organizations, and individuals who have expressed an interest in the subject. Any reader of CONTRACTORS' & ENGINEERS' MONTHLY interested in this act may secure copies of the tentative draft from Dan H. Wheeler, Secretary, the Standard State Mechanics' Lien Act Committee, Division of Housing, Department of Commerce, Washington, D. C.

Existing mechanics' lien laws of various states, as applied to building construction, aim to provide a procedure by which contractors, subcontractors, material men, laborers, and others, if they are not paid promptly may obtain some extra protection beyond their usual right to bring personal action against the owner, contractor or subcontractor who may have employed them. Under these laws, the property and improvements afford security for the debts of those who have contributed to the improvement. To perfect a lien on the property, each claimant is required to file for public record a statement of the amount due him.

If the owner fails to make payment as required by his building contract, the property may be sold and payment made from the proceeds. If the contractor defaults or goes into bankruptcy leaving obligations due workers, material men or subcontractors, these creditors have a claim on the property. On projects carried to completion, the total amount of liens is usually limited to the unpaid balance on the contract price of the work, and where the improvement is not completed the total lien is limited to the unpaid balance of the

WHAT YOU REALLY BUY IS THE WORK THAT IS DONE WITH THE WHEELBARROW

This new No. 64 Bull Frog wheelbarrow represents a definite, valuable advance in wheelbarrow engineering which means more work with less time, effort, and expense than can be obtained with any wheelbarrow not so scientifically designed and constructed.

When a man lifts on the specially shaped handles he knows that he can handle the Bull Frog faster and with less effort than any wheelbarrow he ever used. The handles are just the right length; the legs in just the proper place.

The riser is unusually high, and the narrow, deep, seamless tray is carried well forward over the exclusive Bull Frog "Never Break" wheel. The tray is especially designed for easy dumping into forms without waste of material. This is *the* modern concrete barrow. Write for specifications. Other specialized "Bull Frog" barrows, carts, and scrapers for every mine, foundry, factory, building, public works, and construction purpose. All are *scientifically* as well as sturdily built — a complete line. Catalog on request.

THE TOLEDO WHEELBARROW CO.
TOLEDO, OHIO

BULL FROG WHEELBARROWS

amount earned by the contractor for the work performed. If the claims are not satisfied by the owner, a sale of the property may be compelled by court action.

This study by the Standard State Mechanics' Lien Act Committee was undertaken at the request of several national organizations interested in the construction industry, and the Committee is composed of men representing the principal groups whose interests are affected by such laws, including those whose interests are those of the owner.

The tentative draft contains few new departures, practically all its provisions having been found workable in several jurisdictions. The aim of the Committee has been to produce an act which will adequately protect the interests of the worker and others concerned in construction, as well as the interests of the owner and those who finance building operations. and to distribute as equitably as possible among the groups the burden of securing such protection.

The tentative draft of the act is being distributed and a request is made that comments be forwarded to the Secretary of the Committee before January 31, 1927. All comments will then be collated and carefully studied by the Committee with a view to perfecting the act. The Committee believes that a wide and thorough study will aid in producing an act which will be fair and just to all and which can be recommended to each state legislature for consideration. The Committee also believes that uniformity in this field would eliminate much of the confusion and expense which those doing business in more than one state now experience on account of the wide diversity in the present laws on the statute books of the various states.

Care of Construction Machinery During the Winter

By B. H. DESEBROCK
Service Manager, Harnischfeger Corporation

CONTRACTORS are annually losing thousands of dollars by running their equipment onto some open lot at the end of the season, leaving it exposed to winter weather without protection and neglecting to give it needed attention at the opportune time. It is to eliminate any such loss on the part of contractors and to enable them to obtain a maximum of service from their equipment that the following suggestions are offered:

The first thing to do, before starting the actual work of overhauling, is to ascertain as far as possible what replacements have to be ordered from the factory, so that they can be on hand when needed.

In order to simplify the work of overnauling, the most vital parts are itemized below, so that none will be overlooked:

The Gas Engine

1. Have engine thoroughly inspected by competent mechanic and every part examined for wear.

2. Remove cylinder-heads, clean out all carbon, and grind valves. Inspect crank-shaft and connecting rod bearings; scrape to a perfect fit, or replace if badly worn.

3. Clean out carburetor thoroughly and see if needle valve is worn.

4. Clean out dirt and scale in radiator and cylinder-jacket.

5. Inspect magneto points. Go over all wiring and replace those that are worn or oil-soaked.

6. Remove all old oil and dirt from crankcase, wash with gasoline and fill with fresh oil.

7. Drain and clean the gasoline tank thoroughly.

8. Thoroughly grease all finished parts. Be sure no water has been left in the radiator and pump.

The Machine Itself

1. Clean machine thoroughly of grease and dirt.

2. Inspect all bearings and bushings. Rebabbitt or replace bushings where needed.

3. Go over all bolts and see that all are tight

4. Inspect clutches and brakes and reline if worn. Replace clutch-shifter collars if worn.

5. Inspect corduroys and replace any worn roller-bushings, link pins, or link-pin bushings.

6. Inspect cables. Clean and slush with oil.

7. See that all finished parts are well covered with heavy grease.

8. Thoroughly clean all rusted members with wire brushes and give them a coat of good paint. Cheap paint is a waste of money.

9. Run machine in a shed if possible. Otherwise board it up with cheap lumber and heavy tar-paper.

With all painted parts properly brushed and repainted with a heavy coat of good paint, and all finished parts liberally slushed with heavy grease, outdoor storage during the winter will not do a great amount of damage.

Start *now*— to work for Good Roads!

IT'S none too early. Spring—the season when actual operations must begin—is just over the hill. Plan now to have the Tarvia Truck working in your community this year.

Tarvia roads are moderate in first cost and more economical to maintain than any other type of highway that will stand up under modern traffic. Their non-skid surface is smooth, dustless and mudless all the year round.

Call on our Special Service Department. The experience of skilled highway engineers—based on intimate knowledge of every type of road construction—is freely at your service.

Please address your letter to our nearest office. It will receive prompt and careful attention.

New York · Chicago · Minneapolis · Cleveland · Philadelphia · Boston
St. Louis · Salt Lake City · Baltimore · Toledo · Cincinnati · Kansas City
Detroit · Milwaukee · Providence · Buffalo · Birmingham · Lebanon
Youngstown · Syracuse · Bethlehem · Columbus

The Barrett Company

In Canada:
THE BARRETT COMPANY, Limited, Montreal, Winnipeg, Toronto, Vancouver
Rochester

A Shovel with a Power Dipper Trip

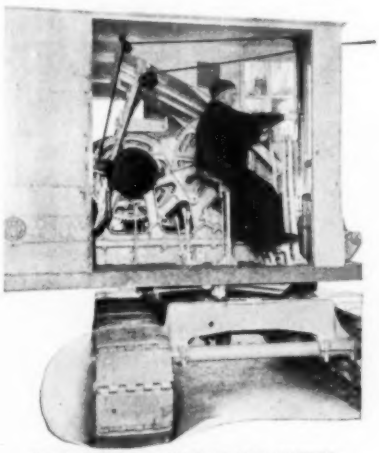
New Method Makes Possible Use of Short Lever for Pulling the Pin of the Dipper

A POWER dipper trip has recently been brought out by the Koehring Company, Milwaukee, and is now furnished as optional equipment on Koehring heavy-duty gasoline shovels. The trip is so arranged that one finger can move the lever which trips the dipper.

It is a well-known fact that one man can coordinate the movements of a machine better than two men. The operator can trip his dipper at the exact instant it reaches the desired place without any delay from a second man. Through the day this means a definite gain in yardage.

With this power unit there is a slight tension on the line and consequently no loose rope down in the pit when digging, or over the truck when unloading. With power operation, only a short lever needs to be attached to the dipper stick for pulling the pin of the dipper. This construction permits the trip cable to follow a parallel line very close to the dipper stick.

The power for the trip cable is obtained by building a small drum with heavy brake lining on the outside, on the end of the rear drum-shaft. A second steel drum, polished on the inside and placed over the first drum, turns when there is sufficient friction between the two. The operator merely controls this friction with the lever, so as to apply power to the trip cable, which is attached to the outside drum.



KOEHRING SHOVEL WITH POWER DIPPER TRIP

A Portable Bin for Road Builders

Method of Assembly Gives More Working Freedom Around the Base of the Bin

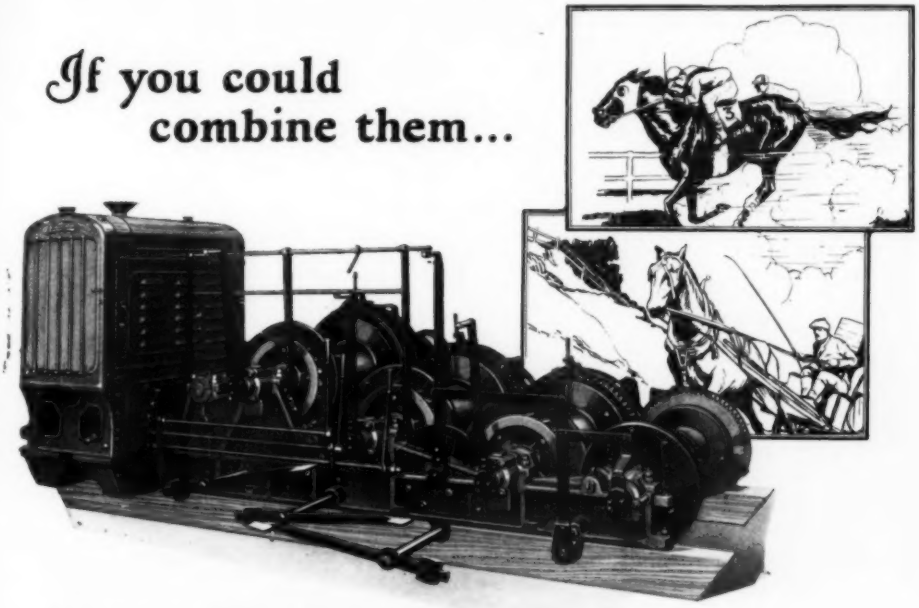
A PORTABLE bin for the use of road builders which is simple in design and of unit construction, permitting its erection at the time of unloading from the railroad car or motor truck in about an hour, has been developed by the James B. Seaverns Company, 1315 South Oakley Avenue, Chicago, Ill. The bin proper has plank sides, and partitions and bottom of 2½-inch dressed flooring with interlocking joints so that nails, bolts and spikes are unnecessary. The side panels are strapped together and provided with lifting rings or lugs so that they can be lifted readily by chains from the clamshell crane or derrick which is always alongside ready to fill the bins.

THE SEAVERNS PORTABLE ROAD PAVER BIN

The Road Paver bin is not set upon horses or bases, the substructure itself being a self-contained structural steel frame which forms a saddle for the plank hopper above. The truss frame, which is four feet deep, allows the batch hoppers to set within the frame, thus preventing the trucks from striking the batch hoppers when loading. These bins are made in capacities of 35, 50, 70 and 100 yards.

The Seaverns batch hoppers with which these bins are equipped may be used either for stone or sand. They are designed to fit directly under the storage bins and are simple in operation. Because of their telescopic construction, which is a unique feature, they may be increased or decreased in volume from 10 to 27 cubic feet by simply adjusting the lower section by means of four threaded bolts. This feature makes it possible to obtain any desired mixture or specification. After the batchers are set for any particular specification no further attention need be given to them. The strike-off gate at the top of the batcher gives positive solid measure and is easily controlled by the attendant by means of a long operating lever. The drop-bottom door is dumped by simply pulling the lever and the door is quickly closed again and is ready for recharging.

If you could combine them...



Race-horse speed Truck-horse power

TRADE MARK
MUNDY
ESTABLISHED 1869

To
Equipment Distributors

The New Patent Three-Speed Hoist is fully protected by patents in the United States and Canada.

Some open exclusive sales territory is now available.

THE "racer" *speeds* with its light load. The "trucker" *pulls,* more slowly but with far greater power. Give the racer a heavy load and it fails miserably—give the trucker a light load and both time and power are wasted

You had somewhat the same situation with the old-fashioned hoist. When a light load came along . . . and you wanted it to tear like Man O' War, it was set for a heavy one . . . and poked like the "brewer's big hoss." It was a matter of an hour to change the reaving, to get a change of speed and line-pull.

Now that's all changed. The New Patent Three-Speed Mundy Hoist speeds like a race-horse on the light loads . . . and pulls like a truck-horse on the heavy ones. Just a shift of gears . . . ten seconds instead of an hour . . . and it is adapted to either condition!

Think of the money that saves!

The Mundy Sales Corporation

Distributors for the J. S. Mundy Hoisting Engine Co.

30 Church St., New York

Agents in Principal Cities

MUNDY HOISTS

The Hoist With The Asbestall Frictions

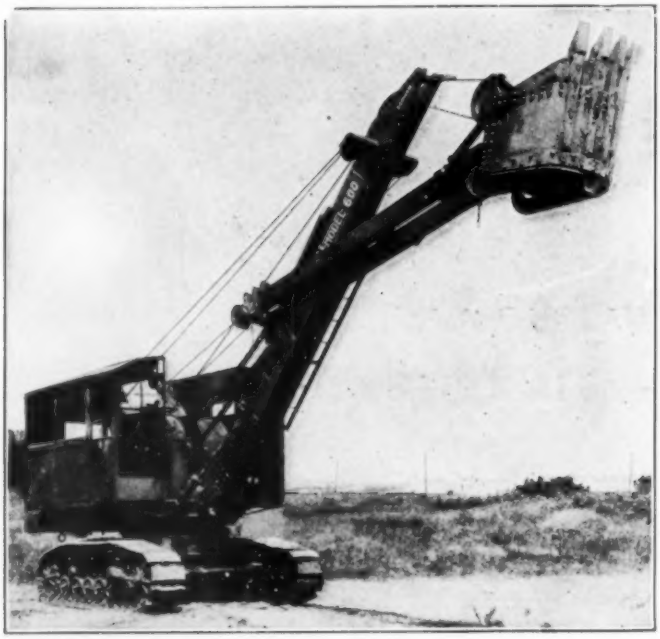
A Line of Excavators Built of Steel

Well-Known Manufacturer Announces New Models in Sizes ½-, ¾-, 1-, and 1¼-Cubic-Yard Capacities

A NEW line of steel excavators, built of steel from the tip of the boom to the corduroy shoes, has been announced by the Harnischfeger Corp. These new P & H models are built in ½-, ¾-, 1- and 1¼-cubic-yard capacities. The manufacturer claims that the heavy cast steel frame construction is so strong that it cannot wear out. The unit cast steel construction insures permanent alignment of all working parts, minimizing the opportunities for anything to work loose. As a result, the shafts will continue to run true and give less wear in the bearings and the gears. The purpose of the unit steel construction is to secure rigidity and, to get the full benefit of the steel construction, all castings are fully machined at the joints and bearing points.

These excavators have less tail-swing than other machines of similar capacities. This is especially important to the basement contractor or to one who works in narrow alleys, since a machine of short rear-end radius has no trouble in working close to basement walls or in swinging around within a narrow space. This feature eliminates much expensive hand trimming.

Another place where an excavator of short tail-swing is valuable, is in the excavation of narrow mountainous roads. In some cases, by using an excavator of short tail-swing, it is possible to narrow the width of the road so that thousands of yards of excavation can be saved.



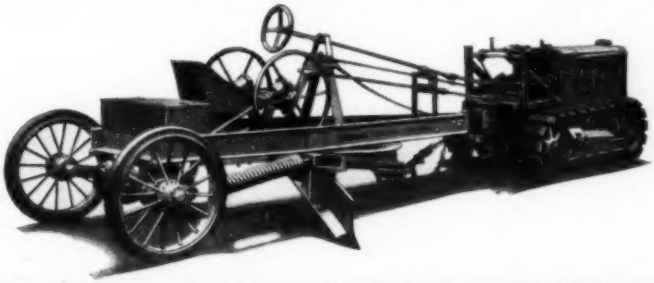
THE NEW HARNISCHFEGER MODEL 500 SHOVEL

The crowding motion of the new P & H line is positive and can force the dipper above the boom point. The crowding is independent of hoisting. The dipper can therefore cut a level floor or any slope of bank. It can also be reversed rapidly and sticky soil can be easily shaken off. There are no air or steam engines on the boom and no cables to wear out.

Sullivan Sells Channeler Business

THE Sullivan Machinery Company, 162 South Michigan Avenue, Chicago, Ill., has announced the sale of its channeler business, outright to the New Albany Machine Manufacturing Company, New Albany, Ind. All completed channeling machines, together with the complete stock of parts, patterns, drawings, tools, etc., have been turned over to the new owners, and orders for spare parts and for new machines should be addressed to them.

The New Albany Machine Manufacturing Company, is well organized and well managed, and is fully capable of giving the best service in furnishing repairs and complete machines.



NOW YOU CAN HAVE SHAWNEE PERFORMANCE
with
"CATERPILLAR", I.H.C. 10-20 or FORDSON POWER

The Shawnee Fordson Power Grader

The Shawnee International 10-20 Power Grader. Also furnished in quick detachable type.

The justly famous Shawnee Power Grader is now available in unit types with Fordson and International 10-20 power, and in quick detachable types with hookups for "Caterpillar" 2-ton and International 10-20.

Quality construction and superior performance form the basis on which Shawnee reputation has been established. The Shawnee is built to outlast and outperform any other road maintenance and patrol machine.

Shawnee construction necessitates a higher first cost—but to the purchaser of graders who is interested in accuracy, dependability, low upkeep and low cost per mile, and in a maintenance machine that continues on the job year after year—first cost is nothing—final cost everything.

And we believe the Shawnee, per year and mile of service, is the cheapest power grader on the market.

All the Shawnee Power Graders will be shown at the Road Show, Jan. 10-14, in space NC 10. It will pay you to see them.

SHAW-ENOCHS TRACTOR CO.

Minneapolis, 2416 University Ave. S. E. Minnesota

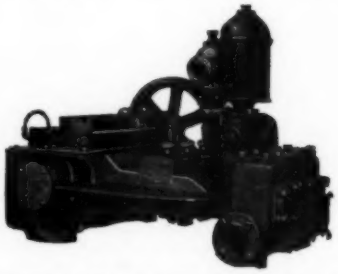
A New High-Pressure Road-Pump

Powerful Force-Pump Equipped with 35-Horsepower, 4-Cylinder Industrial Gas Engine

A NEW pump of large capacity for high pressures and of particular interest to contractors and road builders has been developed by the Domestic Engine & Pump Company, Shippensburg, Pa., in its new Giant heavy-duty force-pump. This pump is a three-cylinder, self-oiling, single-acting plunger outfit. The packing is held stationary by outside adjusting packing glands which are equipped with compression grease cups so that the packing can be kept properly lubricated.

The special features of this pump are the automatic force-feed oiling of all connecting-rod and driveshaft bearings, steel gears which are machine-cut and run in oil, Hyatt roller bearings on the high-speed driveshaft, and the closed crankcase to keep out dirt and retain oil.

The large diameter steel three-throw crankshaft is finished by grinding all the bearing surfaces. Oil is forced through a drilled hole in the shaft direct to the connecting-rod bearings. The valves and valve seats are of bronze and the valves have a 45-degree angle seating-face and are practically self grinding. The valve caps are equipped with adjustable stops to regulate the lift of the valves.



THE NEW DOMESTIC HIGH-PRESSURE ROAD PUMP

The regular equipment includes an air chamber, water-relief valve, pressure gage, and flanged unions for both suction and discharge connections. The pump is regularly furnished powered by a 35-horsepower, four-cylinder industrial type gasoline engine with friction clutch and mounted on a steel-wheeled spring-type trailer. The maximum working pressure of the pump is 600 pounds.

New Bridge Planned Across the Chesapeake

A COMPANY has been organized to build a bridge 8 miles long to span the Chesapeake from a point near Baltimore to a point between Rock Hall and Tolchester Beach on the eastern shore of Maryland. The project is understood to find favor with the War Department, and it is anticipated that the consent of Congress and the Maryland Legislature will be procured without difficulty.

LOCATION OF NEW CHESAPEAKE BRIDGE

The bridge, if erected, will offer the only means of direct communication for vehicular traffic between the two sections of Maryland and will also connect Baltimore with an important part of Delaware. Present conditions require traffic to use ferries or to pass around the bay at its northern end. The highway distance from Baltimore to Chestertown is now about 90 miles. Construction of the bridge will reduce this to 35 miles. The bridge is planned to have a width of 20 to 27 feet, allowing abundant room for two-way traffic employing heavy trucks. The construction will be of steel on concrete piles, and two draws will be provided to accommodate shipping. Large vessels will use the eastern draw, which will have a length of 260 feet, and the western draw will be 60 feet in length.

The project is estimated to cost $10,000,000 and will be completed within two years after construction is begun. Work will be directed by W. Roscoe Bonsal, engineer, of Baltimore.

Don't look for mean motives in everyone. Better get fooled once in a while by giving a person credit for something to which he is not entitled than to discourage a worthy person by suspicion.—Hyster Hy-Spots

See the New Link-Belt K-42 Crawler at the Chicago Good Road Show

Greater Capacity—
More Speed—
Greater Endurance—
"The Best that Money Can Buy"

If you can't get to Chicago, write us—we'll be glad to tell you about the new features of the most powerful machine built of like capacity.

2930A

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying and Power Transmission Chains and Machinery

CHICAGO, 300 W. Pershing Road — Offices in Principal Cities

Some territory still open for agents. Get our proposition.

LINK-BELT CRAWLER

"Built for Service"

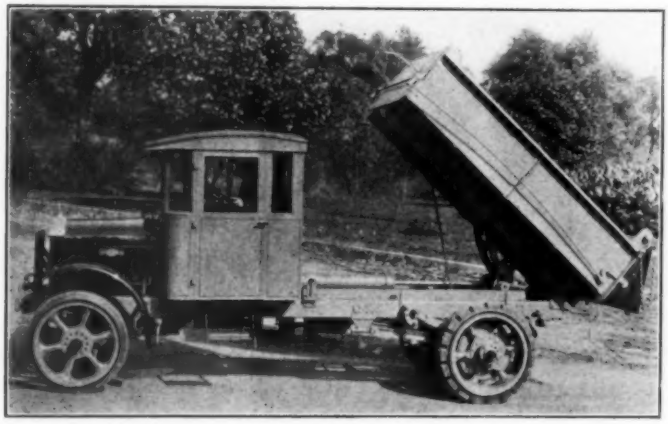
A New Three-Ton Truck

Heavy Frame Made Up of Special-Process, Heat-Treated, Pressed-Steel Channel Sections

A 3-TON chassis which is claimed by its manufacturer to have remarkable pulling ability with two-range transmission and two sets of speeds, and adaptable to all kinds of heavy-duty truck transportation, has been announced by the Indiana Truck Corporation, Marion, Ind. This Model-126 truck is powered with a motor said to contain one-half as many parts as most motors, having a combined crankcase and cylinder block. The high-compression head makes it possible for this motor to develop 60 brake-horsepower. An oil-filter mounted in front of the motor helps to preserve the vital parts of the motor from destructive foreign matter.

ing it possible for the truck to pull through bad roads and to negotiate steep grades under heavy load without undue strain, and its high gear permits a step-up speed as a time-saving factor when the truck returns empty. The frame of this 3-ton truck is a special-process heat-treated pressed-steel channel section of 5/16-inch stock, and the channel section measures 7 inches, with a 3-inch flange.

The rear axle is of the latest worm-drive full-floating type. The worm is mounted at the forward end on a special roller-bearing and at the rear end on two tapered roller-bearings arranged to take the radial load and also the end thrust in



THE NEW THREE-TON INDIANA MODEL 126 TRUCK

The steering gear is of the cam and level type, permitting easy and safe handling at all speeds under heavy loads. The stop and throttle levers are mounted in the center of the steering wheel and the emergency brake and hand-control levers are conveniently placed for easy shifting, just to the right of the driver. The front axle is drop-forged from a single piece of special-analysis carbon steel, thoroughly heat treated. The steering knuckle and spindles are drop-forged from special-analysis chrome nickel steel carefully heat treated and the steering thrust is taken by roller-bearings on top of the steering knuckle.

The two-range multiple-speed transmission gives seven speeds forward and two reverse, making it possible for the truck to pull through bad roads and to negotiate steep grades under heavy load without undue strain, and its high gear permits a step-up speed as a time-saving factor when the truck returns empty. The frame of this 3-ton truck is a special-process heat-treated pressed-steel channel section of 5/16-inch stock, and the channel section measures 7 inches, with a 3-inch flange.

The rear axle is of the latest worm-drive full-floating type. The worm is mounted at the forward end on a special roller-bearing and at the rear end on two tapered roller-bearings arranged to take the radial load and also the end thrust in either direction. The differential is mounted on taper roller-bearings. The power is transmitted to the differential by having two heavy lugs cast on the worm wheel, which fit over the ends of the differential spider. No dependence, therefore, is put on the differential bolts for driving. These are merely to hold the differential and worm gear assembly together.

The cab, which is extra equipment, is equipped with full-length doors, and sliding glass windows operated by a crank. The windshield is of the full-ventilating type and either top or bottom sections will open. The cushions are of the approved type with deep coil springs in both the back and seat cushions.

McMichael Patent Again Sustained

THE Concrete Mixing and Conveying Company has recently won a decision in the United States District Court, Southern District of New York, against the Powers-Kennedy Contracting Corporation and Anthony G. Fleck, restraining the latter's use of what is known as the McMichael patent for concrete placers.

By a recent decision in the United States District Court, later affirmed by the United States Circuit Court of Appeals, the right to manufacture concrete apparatus adapted to placing concrete pneumatically at a distance from the mixer, as in tunnels, foundation work, piers, etc., is virtually restricted to the holder of the McMichael patent and their sole licensee, the Ransome Concrete Machinery Company, Dunellen, N. J.

GALION LEANING WHEEL E-Z LIFT GRADER

Here is a stronger, more durable, leaning wheel grader and easier to operate. Made in 8, 9, 10 and 12 ft. mouldboard sizes.

See this Grader at the Road Show, Spaces W9, W10.

GALION

OFFERS YOU THE LATEST AND BEST IN ROAD MACHINERY

Road machinery progress during 1926 has been Galion progress. New machines and improvements have made Galion the leader in the road machinery field, not only in progressiveness, but also in completeness of line, Whatever your needs in Rollers or Graders, Galion can supply them.

Write for information and prices on the machine you need.

The Galion Iron Works & Mfg. Co., Galion, O.

GALION MASTER MOTOR ROLLER

Users everywhere are loud in their praises of this big 10 or 12 ton motor roller with its powerful scarifier and its Climax Trustworthy four cylinder motor.

SEE THIS ROLLER AT THE ROAD SHOW SPACES W9 & W10

A New Gasoline and Electric Power-Shovel

Equipped with 3/4-Circle Swing and 1/3-Yard Bucket, This Machine Has a Broad Range of Use

A NEW small gasoline or electrically operated shovel has been designed and built to meet the demand for this type of equipment. The Fundom shovel, built by the Fundom Hoist and Shovel Company, Lima, Ohio, is simply designed, so as to permit practically all of the power of the unit to be used in digging. The gasoline unit of this shovel is a Fordson tractor with governor. For electric drive, a 25-horsepower, 900 r.p.m., high-torque, heavy-duty motor of standard make is used.

The boom is built up of 8-inch channels reinforced with plates and ties and is 12 feet long. The mast consists of two 6-inch channel members fastened at the lower end of the yoke casting, the upper end supporting the mast-head casting. The crowding mechanism is operated by a double-pad Thermoid-lined clutch, driving a link chain to the support-shaft, which is provided with two steel machine-cut pinions meshing with steel machine-cut racks on the dipper handle.

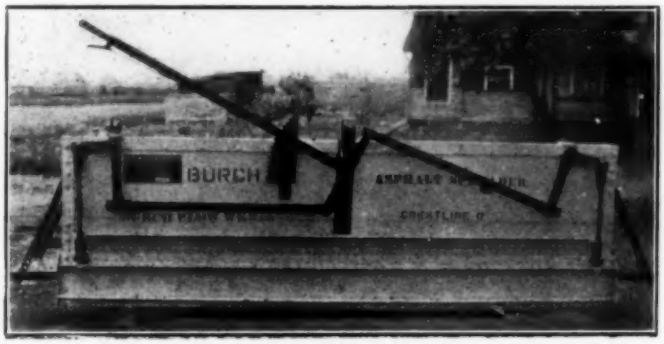
The traveling speed of the complete shovel is three miles per hour. There are three hand-levers and two foot-pedals, all conveniently located, which control all digging operations. The boom travels a full three-quarter swing. The shovel has a capacity of from 10 to 30 cubic yards an hour, depending upon working conditions and the material handled. The dipper is one-third cubic yard when filled level.

A FUNDOM SHOVEL WORKING IN A STONE QUARRY AT KENTON, OHIO

A Spreader for Sheet Asphalt Construction

Outfit Insures More Uniform Delivery of Materials to Grade

A GREAT deal of thought has recently been given to the subject of spreading asphalt, since the methods now commonly used for delivering the material and dumping it on the grade, and shoveling or forking it to place and grading to proper depth, are somewhat antiquated



THE NEW BURCH ASPHALT SPREADER

ON THE GULFPORT SEA-WALL

When Woods Brothers were building the Gulfport Sea Wall at Gulfport, Miss., they faced the problem of placing a continuous belt of concrete on the wall. 75 miles in length. Equipment was needed that would not only bring the wet concrete to position on the wall but would also permit of easy maneuvering, as the work progressed. A portable crane was tried but was replaced by a 24-ft., 24-in. belt, Northern Conveyor, because of its advantages in economy, speed and easy portability.

This is just another instance of the adaptability of Northern Conveyors to the job. Whether it's handling concrete, sand, gravel, stone, crushed rock, brick, coal, ashes, mortar, lime or earth—anything and everything in loose and semi-loose material—a Northern Conveyor handles it quickly and cheaply. And because of their "Built Better" construction, Northern Conveyors can be had in all lengths up to 100 ft. maximum and in six respective belt widths; we can build you a conveyor suitable for any job, large or small.

Write for and keep the Northern Catalog on file.

NORTHERN CONVEYOR & MFG. COMPANY

JANESVILLE, WISCONSIN

in comparison with other lines of road-building operations. Spreading has also required a large number of men and has proved expensive. The Burch Plow Works, Inc., Dept. MA, Crestline, O., has endeavored to develop a machine which would do this work better than it can be done by the old method and at the same time reduce the actual amount of labor to a very small item, thus eliminating many of the worries of the contractor in this field.

The Burch asphalt-spreader is built with rollers in front, and when used on a sandy subgrade the rollers pass over the surface and carry the machine at a uniform height, spreading the material at proper depth. The rear end-gate, or strike-off, is controlled by a lever and is designed to be operated by a man who stands on a platform at the left end of the spreader and who can change the position of the end-gates from a fraction of an inch to several inches in a moment of time, when necessary. The connection from the lever to the end-gate is equipped with turnbuckles at each end, provided for raising or lowering one end more than the other when it is desired to spread the material thicker at one side of a street or road, to give the proper crown.

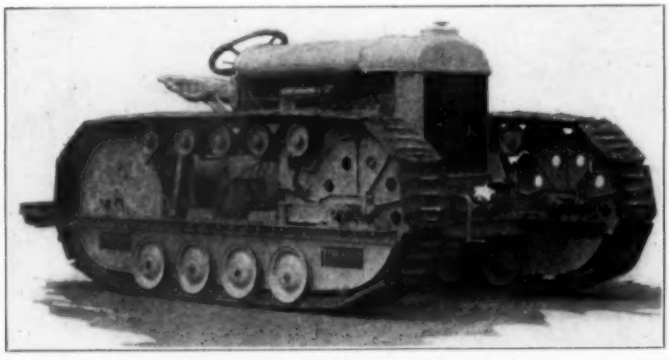
The spreader is built with false ends on the inside of the regular end of the machine, in which there are openings controlled by slides. If the slides are raised to the full height, the material flows out, spreading to the full width of eight feet. If the slides are lowered half way, the material will spread to 7 feet, and, if the slides are dropped all the way down, it will spread to 6 feet. This is very convenient when spreading over roads of different widths.

The small platform furnished at either end of the machine can be used by the operator while the machine is moving forward, thus eliminating the necessity of walking on the finished work.

A New Heavy-Duty Model Full-Crawler

Model-D Unit Developed to Meet the Demand for Tractor Between the 2- and 5-ton Sizes

THE new Model-D heavy-duty Trackson Full-Crawler for Fordsons is designed particularly for work where drawbar pull is of prime importance. This unit has been produced by the Full-Crawler Company, 502 Clinton Street, Milwaukee, Wis., to meet the increasing demand for a powerful crawler tractor, between the two- and five-ton sizes, with the pulling power of from six to twelve horses, combined with large track area, which will carry the tractor over difficult ground conditions.



THE NEW HEAVY-DUTY TRACKSON CRAWLER FOR FORDSONS

The tractor is 75 inches wide, 120 inches long, has a rigid frame, and weighs 4,100 pounds. This makes it adaptable for use with diggers, hoists, loaders, and snow-plows, where great crowding action at low speeds is desirable, and where the tractor carries extra weight.

The Model-D is made from the same electric alloy steel which is used in the standard-model Trackson Full-Crawler. Since the power at the drawbar, the ground pressure, and the tractor's ability to go through soft or rough ground, depend upon the amount of track which is on the ground, the track area of the new model has been increased to 1,600 square inches. Like the standard-model Trackson, the Model-D neeessitates no changes in the Fordson and maintains the regular ground clearance.

The Master Builders Association of Atlantic City

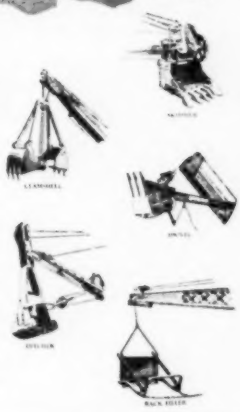
THE Master Builders Association of Atlantic City, N. J., wishes to secure an executive to take charge of its active business affairs and to reorganize the Association. The work is that of an executive secretary and manager and involves not only the carrying on of the business of the Association, but negotiations with the trade and the reorganization of the society to increase its effectiveness. Any executive interested in this work should communicate directly with the Master Builders Branch, Chamber of Commerce, Atlantic City, N. J.

Bear Cat with Skimmer Attachment, on city street grading.

Bear Cat with Clamshell Bucket handling road materials from car to stock pile or proportioning bins.

There's just one reason

for the huge success of the Bear Cat. It pays the owner more per dollar invested.



THE Bear Cat is a dependable, all-purpose machine, low in first cost, low in operating cost, low in repair cost.

Mounted on big full caterpillars for instant and maximum traction, it digs and handles materials with a speed that rivals much heavier and more expensive machines.

For four years now, Byers has concentrated on the Bear Cat, giving up all its other lines, and devoting all its resources and experience of over 40 years to build this one machine better and better.

The first public appearance of the new "Model 27" Bear Cat is the big Byers exhibit at the Chicago Road Show.

The new Bear Cat Catalog, will tell all about this machine, the greatest value we believe, ever offered to contractors. Send for it.

THE BYERS MACHINE COMPANY, Ravenna, Ohio

Builders also of Byers Truckrane

Sales and Service Throughout the Country

The Byers Machine Co., Ravenna, O.
Gentlemen:—
Send me a copy of the new Bear Cat Catalog. The kind of work I am particularly interested in is .....

Name .....
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Town .....
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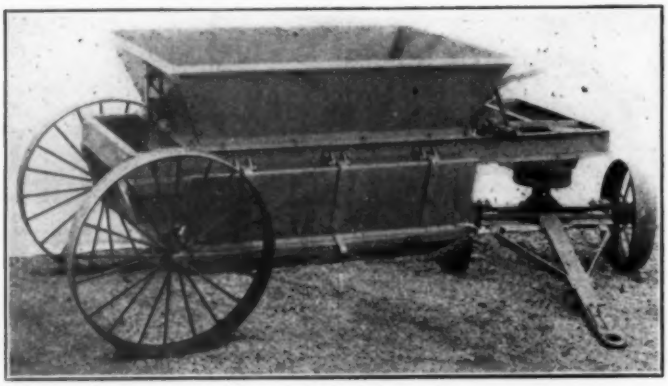
CEM-1-27

BYERS BEAR CAT



THE NEW MIAMI BOTTOM-DUMP TRAILER

A Bottom-Dump Trailer

Unit Designed Especially for Use in Connection with Tractors

A 2½-TON bottom-dump trailer designed for use in connection with tractors or with trucks, provided the speed of the truck is held down to 10 to 12 miles per hour, has been developed by the Miami Trailer-Scraper Company, Troy, Ohio. There are many places where this trailer can be used, as it is suitable for hauling dirt, sand, gravel, crushed stone, cinders and ashes. The unit may also be used in cities for gathering snow, ashes, street sweepings, dry garbage, and other refuse matter.

The trailer is of all-steel construction. The all-steel wheels are each equipped with two Timken tapered roller-bearings, which give the unit an exceptionally light draft. The rear wheels are 40 inches in diameter with a 7-inch face, reducing the required pounds drawbar pull. The chassis frame is of 6-inch rolled-steel channel weighing 10½ pounds per foot. Suitable risers and braces are so mounted as to keep the rear axle rigid under the load. Lubrication of the wheels is accomplished through Alemite nipples, making it unnecessary to remove the wheels except for the occasional cleansing of the Timken bearings.

The drawbar is constructed for attachment at any height, so that these trailers may be coupled in trains of two or more by mounting a towing hitch connector to the rear cross-member of each trailer. The dumping-doors on the body are hinged directly to the chassis frame or channels. This construction results in a low loading height of 56 inches from the ground to the top of the body on the 1½-yard trailer, and 61 inches when equipped with a 5-inch top box. This loading height is valuable for hand shoveling or for use under power shovels.

The winding and dumping device is located at the front end of the trailer at the right-hand side. The dumping lever is so constructed that it may be operated from the tractor driver's seat by means of a rope. The winding lever will close the doors in about 5 seconds.

The trailer as regularly furnished has 1½-yards capacity at water-level loading, and 2 cubic yards capacity when crowned 12 inches in the center. When equipped with an extra ½-yard top box, the capacity is 2 cubic yards at water-level and 2½-cubic yards for crowned loads. The body, the bottom doors, and the winding and dumping device, are so constructed that they can easily be removed from the trailer chassis, giving a chassis on which a platform body can be mounted.

PLACING CONCRETE WITH CABLEWAY ON AERATION AND SETTLING TANKS, DIVISION A OF NORTH SIDE SEWAGE TREATMENT WORKS, CHICAGO, ILL.

Heltzel Mystery Bin

The Largest Trailer Bin Ever Manufactured

80 Ton and 105 Ton Sizes

1. A Twin Type HELTZEL Trailer Bin which avoids the difficult erection of large capacity bins.

2. Equipped with agrabatchers for measuring materials by weight or volume.

3. Weighing Device—modified beam type of scale—two point suspension.

4. Measuring Device—one man hand-wheel operation from platform above the trucks.

5. Can be equipped with device wherein agrabatchers are adjusted by operation of single hand wheel.

And more than a dozen other important improvements.

Now, HELTZEL is introducing the material handling marvel of all time—a huge twin type trailer bin—moved in two halves, each half no larger than a standard 35-ton trailer bin.

Imagine a 105-ton bin cut squarely in two on a perpendicular line running between the two agrabatchers. Imagine a set of temporary legs, fastened upright in the middle, so when one half is removed the other half still remains standing.

You simply stand the two halves upright and together. Fasten them together with 40 bolts. Remove the temporary legs and your bin is erected. Could anything be simpler?

Each half has its own trailer wheels and is towed by truck from job to job independent of the other half.

SIZES

80 Ton 11' 3" x 18' 0" x 20' 0" high.

TRILOK self cleaning steel grating platform 8' 3" high, which completely encircles agrabatcher.

105 Ton same as above but with 2" extension.

Permanent Legs 8" x 8" angles. Bracing 4" x 4" angles.

Agrabatchers for Measuring or Weighing

Operated from platform by wheel rack and pinion method.

Operator located above truck where he can see that all conditions are right for dumping the batches. Operator located where he can see that agrabatchers are O. K.

Agrabatchers interchangeable. Same frame and bolt holes for measuring or weighing agrabatchers.

Weighing Agrabatchers

Two point suspension of load.

Will fill and weigh even if bin is not level.

Standard modified beam type scale, with two point suspension and equalizer.

To prepare for operation when bin is first set up simply balance scale beam. Not necessary to level scale.

Measuring Agrabatchers

Turning of a single hand wheel performs the complete operation of filling, cutting off, dumping the batch of sand and stone, opening the upper gates and closing the lower gates in less than 10 seconds.

Agrabatcher Adjusting Device

Can be equipped with device so that the turn of a single hand wheel adjusts the capacity of the batch. (Bevel gear set, roller chain and sprocket design.)

Summary

The largest trailer bin ever produced.

The most accurate and by far the simplest weighing device.

The speediest agrabatchers.

Most conveniently operated and easiest adjusted agrabatchers.

MAIL COUPON FOR DESCRIPTIVE CIRCULAR

The HELTZEL Steel Form & Iron Company,
29 Thomas Road Warren, Ohio

Mail me descriptive circular on the HELTZEL Twin Type Trailer Bin.

Name.....

Address.....

City.....State.....

The Heltzel Steel Form & Iron Co., Warren, Ohio

Trailer Bins
Agrabatchers
Sectional Bins

HELTZEL

Road Forms
Curb and Gutter Forms
Sidewalk Forms

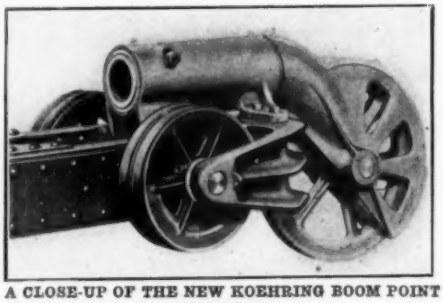
Manufacturers of Trailer Bins, Sectional Bins, Agrabatchers, Road Forms, Curb and Gutter Forms, Sidewalk Forms, Manhole Forms, Sewer Forms, Pipe Forms, Finishing Machines, Strikeoffs, Trail Graders, Sub-grade Testers, Traveling Bridges, Car Unloaders, Steel Mortar Boxes, Steel Tool Boxes, Mixing Boxes.

Swivel Type of Boom Point Fair-Lead

New Equipment Aims for Easier Operation of Boom on Dragline Excavators

A NEW swivel type of boom point fair-lead is being offered by the Koehring Company, Milwaukee, Wis., on its dragline excavators, for use where sloped bank work is necessary. By permitting the fair-lead sheave to swing at will, the cable pulls directly over the center line of the sheave at all times, irrespective of the position of the bucket. All cross-pull and friction between the sheave face and the cable is said to be eliminated. In addition to giving longer life to the cable, it saves the swing clutches and increases the speed of operation. The operator finds it possible to drop his bucket at the right spot without giving his attention to the position of the boom.

The Koehring swivel type of boom point consists of a swivel sheave casting which journals in a cylindrical bearing. The bearing is rigidly supported by the boom point yoke, which in turn is bolted to the tip of the structural steel boom. This



A CLOSE-UP OF THE NEW KOEHRING BOOM POINT FAIR-LEAD

type of boom point is interchangeable with the regular boom point construction and can easily be put on in the field.

Glass Piers and Wire Suspensions

A Fantastical Solution of the Golden Gate Bridge Problem

IN view of the recent agitation in San Francisco, caused by the Government's refusal to allow a 6-mile bridge to be built across San Francisco Bay, connecting Oakland and the peninsula, a communication purported to have been received by the *Daily Pacific Builder*, a San Francisco construction sheet, is of interest to contractors and engineers all over the country.

A firm of questionable origin, calling themselves Beach & Sun, offers, in a letter addressed to "The Honorable Mayors and officials of San Francisco and Bay Cities, and the Honorable Supervisors of Alameda and San Francisco Counties, banks, capitalists and other honorable citizens," to form a $2,000,000 corporation "for the purpose of constructing a string of *glass piers and wire suspension bridges* connecting your cities."

It is explained that a single long span, "longer and higher than the Philadelphia-Camden bridge lately completed," would give Uncle Sam sufficient room to pass through without crowding his cruisers or cramping his airplanes.

It will be remembered that the War Department in its recent report forbade construction of a bridge north of Hunter's Point, which is about four miles south of the Golden Gate and not close enough to the business centers of either Oakland or San Francisco to make communication easy. The War Department's objection was that if the bridge were bombed in war time, the fleet might be bottled-up in San Francisco Bay.

The firm of "Beach & Sun" offers in its letter an explanation of the proposed method of construction of the glass piers, which, they claim, could be repaired quickly in case "Denmark or Switzerland should drop a bomb on one of them."

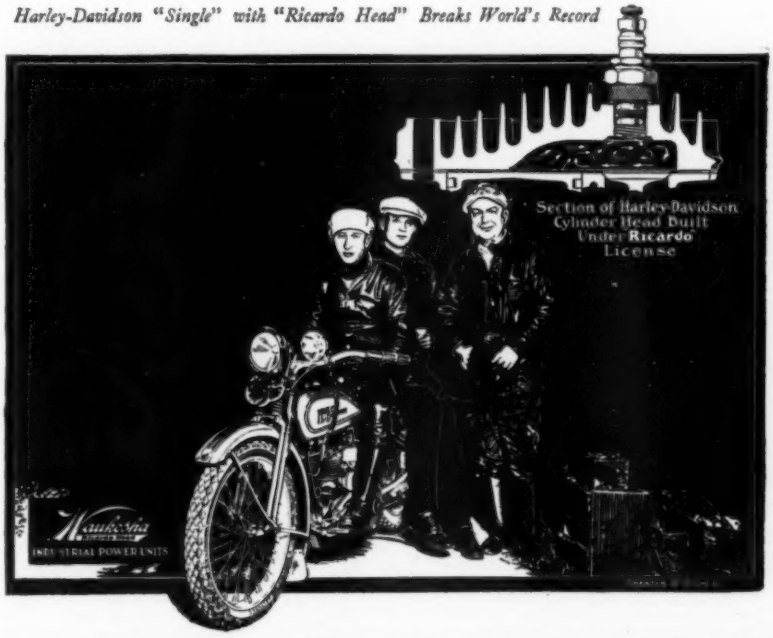
A scow, 300 by 300 feet, is to be moored at one of the channel islands, where beach sand is available in great quantities, and the floor of the scow covered with 6 inches of clay, on which are placed piles of sand. A 72-inch lens, furnishing the "hottest heat known to mankind," is to be trained on these piles of sand.

"The fine sand becomes lava under this focus," the letter continues, "and additional sand is continuously 'shot' over the melted mass until it attains a height of more than 300 feet. Afterwards, the sides of the pier are melted to a height to make it float."

The floating glass pier is then towed into position and sunk, where its tremendous weight forces it into the debris at the bottom of the bay, down to hardpan, aided by hydraulic pressure exerted through a hollow cylinder bore in the center of the pier. There is no explanation offered of the method of constructing the proposed "wire suspensions" between piers.

Contractors and engineers in San Francisco are generally skeptical of the practicability of the plan offered by "Beach & Sun," but the letter afforded considerable amusement.

Harley-Davidson "Single" with "Ricardo Head" Breaks World's Record



Stretching Gasoline Gallons

High power and unusual economy distinguished the American Motorcycle Assn. Sanctioned Performance of the Harley-Davidson "Single" during a recent seven-day non-stop reliability run. A top speed of 54.54 M.P.H. (electrically timed) was obtained at the finish, and *124.8 miles per gallon* averaged during the seven days. This wonderful performance is largely attributed to the "Ricardo Head" used. All Waukesha Engines have been equipped with "Ricardo Heads" for over three years which accounts for their economy and power.

A Ford engine to be as efficient as this "Single" would have to develop over 65 H.P. which is another proof of what a "Ricardo Head" can do. Remember, Power, Economy and Elimination of "Ping" are the three most important advantages. Write for "Ricardo Head Principles," a booklet telling all about them.

INDUSTRIAL EQUIPMENT DIVISION

WAUKESHA MOTOR COMPANY

Waukesha Wisconsin

New York	Kansas City	Denver	Tulsa	Houston	San Francisco
Aeolian Building	*V. L. Phillips Co.*	*Wilson Machy. Co.*	*C. F. Camp Co.*	*Portable Rotary Rig Co.*	*C. A. Watts*

Exclusive Builders of Heavy Duty Gasoline Engines for Over Twenty Years

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

A New 5-Ton, 4-Cylinder Motor Roller

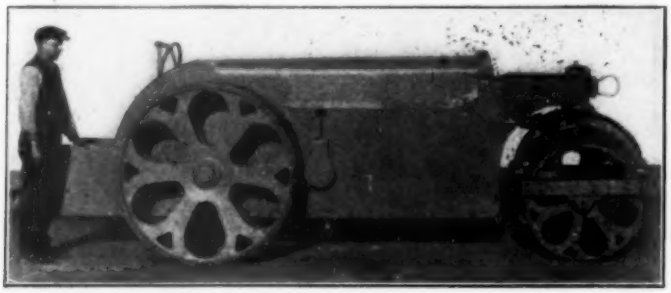
Manufacturer of 10-ton Unit Announces 5- and 7-ton Sizes

FIVE years ago the Huber Manufacturing Company, Marion, Ohio, announced a 10-ton, 4-cylinder motor roller of somewhat different lines from the conventional road roller at that time. The success of this roller has led to the manufacture of 5- and 7-ton sizes along practically the same lines.

This smaller Huber motor roller is powered with a Waukesha 4-cylinder engine developing about 30 horsepower. The engine is equipped with a circulating pump, a high-tension magneto, an oil-spraying air-cleaner and a governor control. The roller frame is made of boilerplate, tied and braced for rigidity to afford proper support for the engine and transmission. The transmission consists of chrome-nickel steel gears, machine-cut and heat-treated. All gears, including the final drive, are enclosed in a heavy cast iron case, which is dust- and dirt-proof, and run in a bath of oil.

A built-in spur-gear differential is a feature of the transmission. This differential throws the same pulling strains on both drive rollers, no matter whether the roller is working on a straight pull or a curve. The roller has two speeds forward and two reverse and will travel in each direction in each speed. The change from forward to reverse is accomplished without the shifting of gears. A single control lever shifts heavy frictions, one for the forward motion and one for the reverse. When the lever is in central position, it is in neutral and both frictions are released. The manufacturer claims several advantages for this control. The change can be made without any delay, as there are no gears to shift. The friction wear is distributed through three clutches, giving a cushion start, which relieves strains on the machine.

Both front and rear rolls are solid cast nickel iron, and the front yoke, which is of a distinctly Huber design, is of the same material. This small roller has a scarifier attachment as well as a grader-blade attachment.



THE NEW HUBER FIVE-TON ROLLER

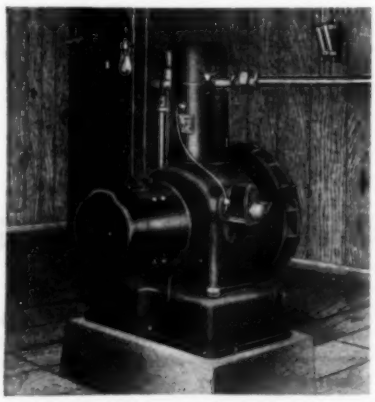
A New Light and Power Plant

Non-Battery Unit Valuable for Contractors

A NEW non-battery design of light and power plant is being manufactured by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., to furnish light and power at places where central station service is not available. It is also valuable for auxiliary electric service and for standby service, and should prove a valuable unit for contractors.

This plant, known as Type E-86, is a non-battery, 2,000-watt, 110-volt plant, particularly adaptable where the use of batteries is not desirable. The new plant will develop 4 kilowatt hours of power on one gallon of fuel. It is air-cooled, lubricated by the splash system, and no electrical parts are exposed. The plant has a shipping weight of 695 pounds.

When you wish to know the name of the leading distributors in any city, consult the Directory, pages 183-213.



A NEW COMPACT LIGHTING UNIT FOR CONSTRUCTION JOBS

Here is the *New* *ERIE* AggreMeter

1927 Portable Model

Type E. AggreMeter Plants, for road and street work where sand and stone is stock piled or where car delivery is constant.

Shipped as a unit or assembled on a flat car; can be hauled from job to job on a truck. Capacities of 17, 22, 27 and 40 cubic yards.

THE new 1927 Erie AggreMeter Plant represents the most modern and efficient means yet devised for handling and measuring materials in bins.

Note these features:

1. Portable — may be shipped on a flat car assembled or semi-assembled with legs detached.
2. Quickly erected—simply hoist the bin and bolt self-supporting legs in place.
3. Self-cleaning—sides are on a sharp angle, free from any obstruction to retard flow of material.
4. Operated by one man.
5. Fast and accurate—full size batches in a minimum of operating time.
6. 100 per cent salvageable at end of every job.
7. Durable—Erie construction insures maximum service.

Erie AggreMeter Plants, of both the volume and weighing types, are made in all capacities, from 17 to 133 cu. yds. Where maximum portability is desired the smaller plants are preferred, while the larger ones are more suitable for central mixing plants, material yards, or road jobs where large bin storage is required.

Measuring devices sold separately when desired, to be easily attached to bins by means of bolts.

Send coupon for full information.

ERIE Buckets

are of all steel construction of the power arm type and due to their superior design and rugged construction will stand up under the most severe service. Maximum closing power and will outdig any other bucket of equal weight. We make both the rehandling and excavating two-line buckets in our Peerless and Special Digger types and are prepared to furnish special buckets on short notice.

THE ERIE STEEL CONSTRUCTION CO.
ERIE, PENNA.

Mail the Coupon—

The Erie Steel Construction Co.
Erie, Penna.
You may send me information on
( ) AggreMeter Plants for.....
( ) Buckets for.....
Name.....
Address.....
Town and State.....

C. & E. M. 1-27

A One-Man Tunnel and Subway Shovel

Locomotive Frame Carries Dipper, Boom, Belt-Conveyor and Motor

THE improved all-steel Conway shovel for tunnel and subway work has three major elements—a mine locomotive frame, a dipper, and a belt-conveyor that carries the material to the cars. The locomotive frame, on which are mounted the dipper, the dipper-arm or boom, the belt-conveyor, and other accessory parts, runs on the regular mine or tunnel track under its own power. The shovel is not clamped to the track, thereby making it possible to use the entire 10-ton weight of the locomotive in crowding. Power for the entire machine is furnished by one 20-50-horsepower motor, depending upon the size of the car. A 30-horsepower motor is recommended. The Conway may be air-operated, using a 30-horsepower reciprocating air engine.

CONWAY LOADER WITH DIPPER SWUNG TO SIDE FOR WIDE CLEAN-UP

The digging mechanism consists of twin hoist-drums, clutch-operated. Heavy load-chains control the dig and swing of the dipper. The dipper is swung 90 degrees in a vertical plane on the boom hinge. The dipper and boom are swung in both horizontal and vertical planes by means of a king-bolt to which the other end of the boom is hinged. The swing of the dipper, the crowding action and the selective digging elements are controlled by the operator. The length of the boom and the design of the dipper are modified to suit the headroom requirements. The dipper is built of heavy plate with manganese lip or teeth.

The conveyor receives its load as it slides from the dipper, down the boom to the belt. An adjustable deflector reduces the belt-wear. The load is deposited uniformly over the entire length of the longest and highest car without hand-trimming.

In operation, an empty car is coupled behind the shovel and on the same track. The shovel crowds forward under its own traction until the dipper starts to get its load. The operator, standing on the running board at the side of the machine, raises the dipper to a horizontal position by means of a hand-lever, picking up the load as the dipper swings through its digging-arc. From this position, continued hoisting on the load-chain raises the dipper and boom to an angle sufficient for the material to slide out of the dipper, down the troughed boom, to the inclined conveyor belt, which carries the material to the car. The operator can feel his way in rough boulders by elevating or lowering the digging-lip with slight pressure on the hand-levers. The crowding distance and the moment of digging are optional with the operator.

While placing the dipper load on the belt the operator, by foot-pressure on the reverse lever, moves the shovel back a few feet from the muck pile. The operator then lowers the dipper to digging position by slacking off the hoist chains. The position of the next digging operation is determined by the relative degrees to which the chains are released, the dipper and boom swinging to the side of the chain which is retarded. Thus it is possible to dig at nearly right-angles to the center line of the track.

CONWAY LOADER WITH DIPPER AT COMPLETION OF DIGGING ARC

Among the various kinds of tunnels on which these shovels have been used, are the Moffat Tunnel, the Melones Dam Pressure Tunnel, the Hetch-Hetchy Tunnel, ant the Wanaque Tunnel in New Jersey. The Conway Shovel is made by the St. Louis Power Shovel Company, 322 Chemical Building, St. Louis, Mo.

For More than a Quarter of a Century Lakewood has Served the Construction Industry

Paving Equipment

Finishing Machines
Subgraders
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Graderooters
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Aluminum Straight Edges
Batch Box Cars
Steel Batch Boxes

Construction Equipment

Concrete Mixers
Steel Towers
Chuting Equipment
Mast Chute Plants
Concrete Carts
Concrete Buckets and Cars
Clamshell Buckets
Bin Gates

Narrow Gauge Track and V-Dump Cars

Write for Bulletins

THE LAKEWOOD ENGINEERING COMPANY
Cleveland, Ohio

TRAYLOR

(12 in. by 10 in. Gasoline Engine Driven)

PORTABLE TYPE COMPRESSOR

Do you know that the TRAYLOR is a horizontal type, slow-speed, double-acting compressor—worm drive—ball bearing mounted throughout—and offers advantages in the way of *large capacity, high efficiency, freedom from vibration and long life?*

Use the TRAYLOR and reduce your PNEUMATIC TOOL WORK COSTS TO A MINIMUM. Will operate five jackhamer drills.

CEMENT-GUN COMPANY, Inc.

Allentown, Pa.

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San Francisco — Seattle — Jacksonville, Fla.

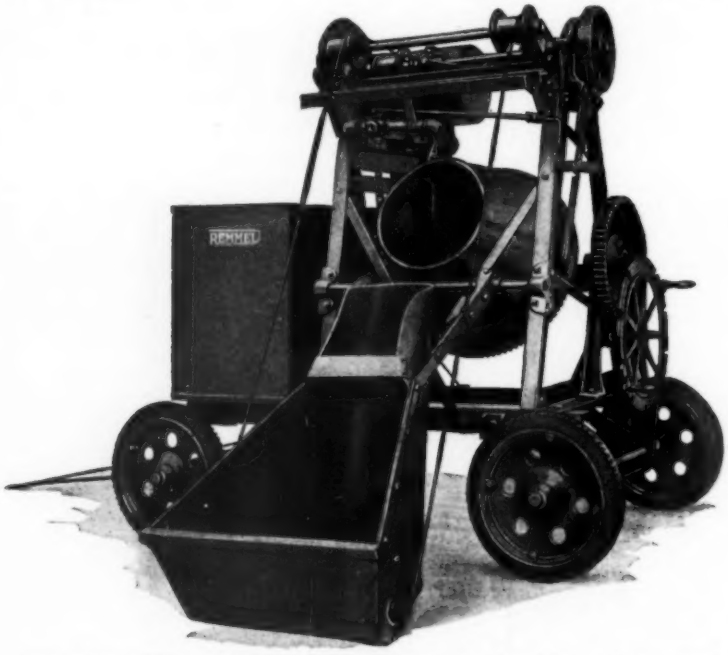
Write us for information regarding the "CEMENT-GUN" and its sand and cement product "GUNITE." We have a Contract Department prepared to give you estimates on any work that you may have.

CEMENT-GUN COMPANY, Inc.
Allentown, Pa.
Gentlemen:
Please send us full information on the TRAYLOR compressor.
Name .....

Concrete Mixers with Chainless Drive

Manufacturer Claims Advantages for Direct Drive in Eliminating Breakdowns

THE Remmel direct-drive mixer, made by the Remmel Manufacturing Company, Kewaskum, Wis., is a departure in batch-type mixers, in that it eliminates belt- or chain-driven units. The Remmel chainless drive engages the ring-gear at the bottom of the mixing drum, being connected directly to the engine crankshaft. With this direct drive, the chance of breakdowns is claimed to be practically eliminated. The manufacturer calls attention to the fact that there are no chains to become slack and jump, wear or break. Less power is said to be required because of reduced friction.

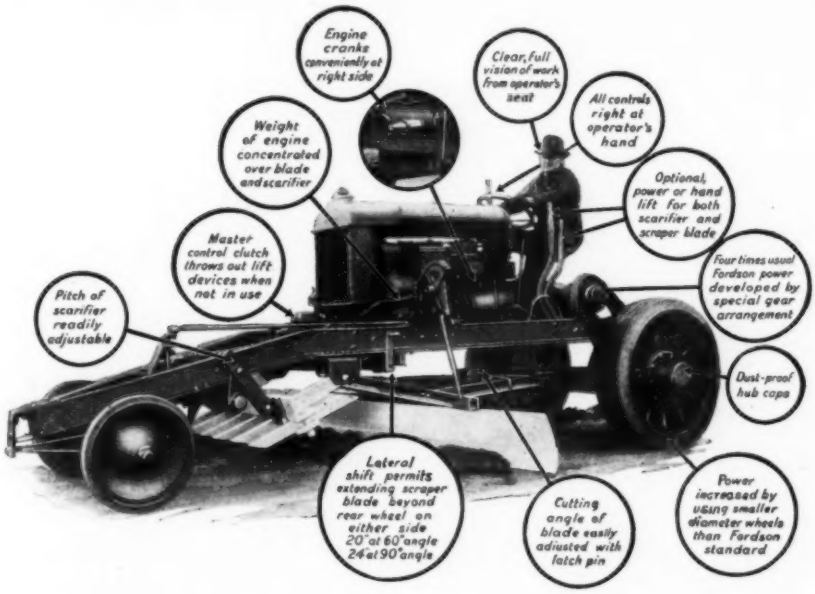


THE REMMEL CHAINLESS DRIVE CONCRETE MIXER

The locking tilting-mechanism, which takes the form of a tilting wheel on the 3½ and 5 mixers and a tilting handle on the 2, 2½ and 3 mixers, is claimed as another distinct advantage. Tilting of the drum is accomplished by means of a flywheel with a hand grip which operates the tilting gear through a small pinion cast into the wheel. The gear ratio is one to five. In other words, five complete revolutions of the flywheel would bring about one complete revolution of the drum hanger shaft. Two complete revolutions of the flywheel move the drum from a vertical position to the tilting position. The drum can be locked in any position, either right or left, by means of a sliding shaft which, when it pulls out, engages a notch in the face of the flywheel. This shaft has a guide-pin and spring to prevent it from releasing the wheel. The notches in the wheel are so spaced that the drum can be locked in almost any position with one-inch variation in pitch. The fact that the drum tilts in both directions and can be locked on either side, makes it possible to load from one side and discharge on the opposite side. Thus, the mixer can be set close to the material pile without interfering with the handling of either raw material or finished batches.

The bowl, or base, is a solid casting to which is bolted a heavy sheet-steel drum having a large reinforced opening. The ring-gear is cast with the bowl. Paddles or blades in the drum are so arranged as to allow free mixing, avoiding corners or pockets where concrete might lodge and harden. The drum can easily be kept clean at all times if, after each job, a pail or two of water is thrown into it, and allowed to revolve a few minutes and then discharged.

See pages 183 *to* 213 *for the largest directory of distributors ever published in* CONTRACTORS' & ENGINEERS' MONTHLY.


Engine cranks conveniently at right side
Clear, full vision of work from operator's seat
All controls right at operator's hand
Weight of engine concentrated over blade and scarifier
Optional, power or hand lift for both scarifier and scraper blade
Master control clutch throws out lift devices when not in use
Four times usual Fordson power developed by special gear arrangement
Pitch of scarifier readily adjustable
Dust-proof hub caps
Lateral shift permits extending scraper blade beyond rear wheel on either side 20" at 60° angle 24" at 90° angle
Cutting angle of blade easily adjusted with latch pin
Power increased by using smaller diameter wheels than Fordson standard

A Motor Grader that WORKS!

Everything for the Road Maker

Road Graders
Road Drags
Road Oiling Machines
Heating Kettles
Rock Crushers
Steam Road Rollers
Tandem Rollers
Motor Road Rollers
Corrugated Culvert Pipe
Gravel Screening Plants
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Road Plows
Rooter Plows
Drag Scrapers
Wheel Scrapers
Dump Wagons
Sand and Gravel Plants
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Good Roads MACHINERY
TRADE MARK

YES—in every sense of the word—the new Good Roads Motor Grader WORKS! Works—in the sense that it is the result of years of study, therefore free from the faults of hastily contrived devices. Works—in the sense that it performs a big daily stint; not limited to light jobs. Built for rough going and long service; side members of frame are 6-inch ship channel. Easy to operate. Friction cone clutch makes it safe even for inexperienced drivers. Write today for catalog containing full description. Better still, ask for a demonstration.

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KENNETT SQUARE, PENNA.

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Atlanta, Ga. . . 569 Whitehall St.
New York, N.Y. . . 50 Church St.
Philadelphia, Pa., 2037 Commercial Trust Bldg.

Good Roads MACHINERY

Current Happenings

Chain Belt Representatives

THE Chain-Belt Company, Milwaukee, Wis., has announced the appointment of F. C. Wilcox, who for eighteen years was President of the Foote Concrete Machinery Company, Chicago, Ill., as Eastern Manager of Rex paver sales. With headquarters in New York City, Mr. Wilcox will manage the distribution of Rex pavers in the eastern and New England States.

Among the eastern distributors now representing the company are the H. O. Penn Machinery Company, New York City, Staley & Morris, Inc., Philadelphia, Pa., George W. Whitehead Company, Buffalo, N. Y., Brewster & Williams Company, Syracuse, N. Y., K. B. Noble Company, Hartford, Conn., and Borden & Remington Company, Fall River, Mass.

McCoy Promoted in Du Pont Explosives Department

THE Explosives Department of E. I. Du Pont de Nemours Company, has announced the appointment of J. W. McCoy as Assistant General Manager of the department. For the last year he has been director of the manufacturing division of the department. He is widely known in the explosive manufacturing field. Mr. McCoy was for many years engaged in executive positions at the Repauno plant at Gibbstown, N. J., and finally was Manager there. Since 1919, he has been engaged in important administrative positions in the Explosives Department of the Wilmington office.

Pittsburgh Testing Laboratory Opens New District Branch Laboratory

THE Pittsburgh Testing Laboratory, Pittsburgh, Pa., has recently opened a new Detroit branch laboratory for testing cement, concrete, sand, stone and allied materials. In this laboratory there are presses capable of making compression tests up to a total load of 200,000 pounds on concrete, building block, tile stone and other materials.

There is a completely equipped cement-testing laboratory, including briquette storage, moist closet in which the humidity is automatically controlled and all the necessary equipment to test cement in accordance with the American Society of Testing Materials' specifications and the practice recommended by that body.

This new laboratory at 414 Lightner Building, 242 West Lafayette Boulevard, Detroit, is equipped also to test sand, gravel, broken stone and other materials used for concrete aggregate and for road-building materials. It is expected later that a portable core-drilling equipment mounted on a truck, to be used for drilling cores from pavements, will be added to the equipment of this branch, for operation exclusively in the Detroit territory.

Mundy Appoints Ziegler as Pittsburgh Distributor

THE Mundy Sales Corporation, 30 Church Street, New York, has announced the appointment of George W. Ziegler Machinery Company, 528 First Avenue, Pittsburgh, Pa., as exclusive distributor for Mundy hoisting equipment, including the new patent three-speed hoist.

Littleford Engineers Complete Inspection Tour

THE annual inspection tour of the engineers in charge of road maintenance and construction equipment in the organization of Littleford Brothers, 485 East Pearl Street, Cincinnati, Ohio, has recently been completed. The trip covered a period of about four weeks and included the states of Ohio, West Virginia, Pennsylvania, Maryland, Delaware, New Jersey, New York, and Connecticut.

The object of this annual tour is to view the tar and asphalt heaters, and other products of Littleford manufacture, in operation, to interview the men in charge of them, to offer suggestions for obtaining the greatest degree of efficiency and to learn of any changes that might be made to improve the line.

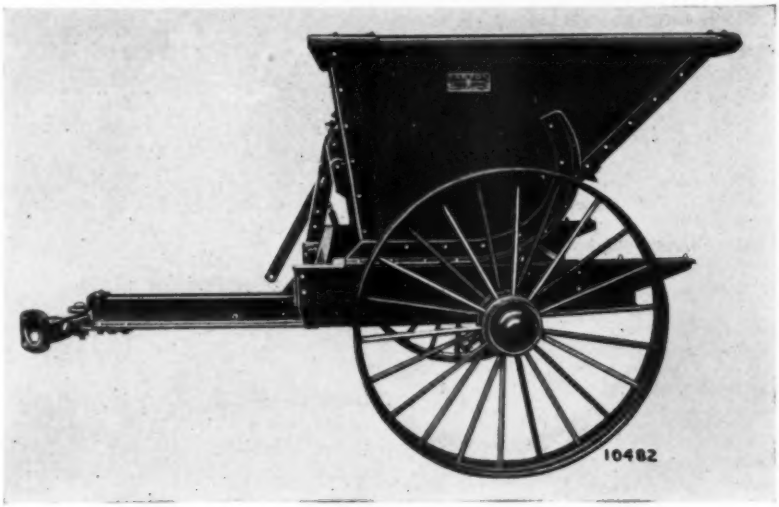
It was gratifying to these engineers that out of more than one hundred interviews, no serious complaints were received. A few good suggestions for improvements of a minor nature were received and these are now being incorporated in the new equipment being manufactured.

New Reduction-Gear for Gas Engines

THE normal speed of a heavy-duty gasoline engine averages about 950-1,000 r.p.m., yet many units to be driven must be run at speeds decidedly lower than this rate per minute. This reduction in speed may be secured by the use of pulleys of different ratios, or by some mechanical means, such as a speed-reduction gear set. With the requirements of engine users in mind, the Engineering Department, Climax Engineering Company, Clinton, Iowa, has designed a 3½ to 1 reduction-gear for use with Climax gasoline engines Models TU, R4U and R6U.

The newly designed speed-reducer consists essentially of a compact set of heat-treated cut gears, enclosed in an oil-proof dustproof housing which is bolted to the flywheel housing of the engine. The high-speed shaft and the low-speed shaft rotate in the same direction. These gears run in oil and are designed to operate with a minimum of noise. The reduction-gear unit embodies a Twin Disc clutch, thus allowing the engine to be started independently of the load. The load is thrown on after the engine is in operation. The driven unit may be connected by flexible couplings or by belt to the power-unit.

REDUCED PRICES OF EASTON BODIES



EASTON FORTY TRAILER *ROLLOVER* TYPE

Price reduction effective December 1st, 1926

Now $250—F.O.B. Easton, Pa.

Easton Forty Trailers are rugged, reliable, economical to operate, strictly a one-man-operated unit. The tractor driver releases the latch and the body automatically rolls over to a 60° angle. All the load goes out.

EASTON FORTY TRAILER *RAPIDUMP* TYPE

Price reduction effective December 1, 1926

Now $250—F.O.B. Easton, Pa.

The Easton Forty Trailer equipped with RAPIDUMP body, has the extremely low loading height of 34 inches. Where hand loading is to be done, the Easton Forty RAPIDUMP meets the demand.

Write for illustrated bulletin

EASTON CAR & CONSTRUCTION CO.

EASTON, *Offices and Works* **PENNA.**

Heil Announcements

THE Heil Company, Milwaukee, Wis., has announced the appointment of the Smith Moore Vehicle Company, 408 North Fifth Street, Richmond, Va., as distributor for Heil tanks, bodies and hoists in Virginia and the Carolinas. Six Wheels, Inc., 1223-33 Santa Fe Avenue, Los Angeles, Calif., has been appointed distributor for Heil hoists in southern California. The Arizona Truck and Tractor Company, Phoenix, Ariz., will distribute Heil products in Arizona.

The Heil Company has opened a direct branch office for sales, service and stock in Greater New York. George Kuhlman, who has been Branch Manager of the Heil Company in Philadelphia since 1922, has been named District Manager for the New York and Philadelphia territories, with headquarters in New York, at Rawson Street and Queens Boulevard, Long Island City, N. Y.

R. C. Schultz, who has been connected with the Heil Company branch in Chicago, has been appointed Cleveland representative, with headquarters at the Gustav Schaefer Wagon Company, 4180 Lorain Avenue, Cleveland, Ohio.

New Barber-Greene District Office

THE Barber-Greene Company, Aurora, Ill., has announced the opening of a new office, in Kansas City, Mo., at 2045 Main Street, with E. H. Cooper, District Manager, in charge. The complete Barber-Greene line will be handled through this new office.

Solvay Sales Organization

THE Solvay Process Company, Syracuse, N. Y., has announced that, effective January 1, 1927, a new company, known as Solvay Sales Corporation, will become the exclusive distributor of the products of The Solvay Process Company. Solvay Sales Corporation will acquire the entire business of Wing & Evans, Inc., and will assume all contracts executed by Wing & Evans, Inc., covering the patents of The Solvay Process Company.

Solvay Sales Corporation will take over the entire personnel of Wing & Evans, Inc., and this personnel will become the operating staff of the sales corporation. All offices and branches of Wing & Evans, Inc., will be continued as offices and branches of the new company.

A New Use for Lime in Sheet Asphalt

HYDRATED Lime as a filler in asphalt mixtures, produces higher stability values than an equivalent amount of the more commonly used materials, according to investigations conducted over the last three years by Prevost Hubbard and F. C. Field, of the Asphalt Association. These investigations were instituted because a greater resistance to displacement is necessary in order that bituminous mixtures may successfully resist the stresses to which they are subjected by modern traffic.

The investigators went thoroughly into their work, covering the entire field. They developed a highly satisfactory method of testing for stability in asphalt briquettes, which might either be cored from pavements or prepared in the laboratory. Supplementary to their report they made the following statement:

"Recent investigations of methods of increasing and of closely controlling resistance to displacement of asphalt pavements under modern traffic, have emphasized the very important stabilizing effect produced by mineral fillers as a constituent of paving mixtures. It has long been realized among paving engineers that fineness is a necessary characteristic of good fillers, but the effect of variations in fineness has never been thoroughly understood. However, only a very limited number of types of finely divided substances have been used so far in paving practice.

"Among the little-used products which are widely available in large quantities, hydrated lime gives promise of being particularly well adapted for use as a filler, on account of both its extreme fineness and surface texture. It is believed that the research data secured relative to this material, coupled with practical results obtained where hydrated lime has been used in actual construction, merits favorable consideration by paving engineers in future work."

Summarized, the conclusion reached by the investigators, based on their previous work and that presented in the bulletin of the National Lime Association entitled, "The Value of Hydrated Lime as a Filler in Asphalt Paving Mixtures," are:

1. Hydrated lime is a more efficient stabilizing agent in asphalt paving mixes than is the average limestone dust filler when used in the customary percentage of the total mix.

2. No difference in the stabilizing value of different limes can be attributed to variations in chemical composition—that is, to the lime being high-calcium or high-magnesium.

3. The maximum stabilizing and void-reducing effects of hydrated lime, in paving mixtures containing a well-graded sand, appear to be obtained by the use of approximately 15 per cent of lime.

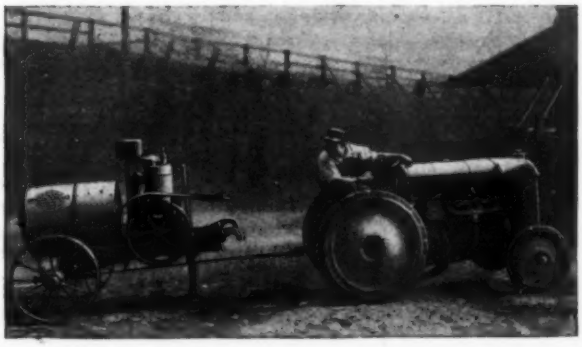
4. In sheet asphalt paving mixtures with well-graded sand, it appears that about 13 per cent, by weight, of hydrated lime, is equivalent to 20 per cent, by weight, of average limestone dust, and about 8 per cent of lime is equivalent to 15 per cent of limestone dust.

5. Hydrated lime appears to be better adapted for use with a relatively soft asphalt cement, than is limestone dust, and when so used, indications point to the production of textures of high stability at 140 degrees Fahrenheit, which are less likely to crack in cold weather.

6. Hydrated lime is an especially desirable filler for use with uniformly fine sand, and its superiority to limestone dust for such use may make available for sheet asphalt construction fine sands which are at present eliminated.

CURTIS COMPRESSORS, HOISTS, CRANES, CAR WASH SYSTEMS, PORTABLE COMPRESSOR UNITS

At the Road Show



Chicago Jan. 10, 1927

What high-grade compressor equipment is priced so low as the combination of these standard units?

The combined Curtis Portable Compressor, with Fordson tractor, costs *complete* considerably less than any comparable equipment! The reasons: Both units are completely standardized. Both are manufactured by large, well financed, long established companies. Both are produced in quantity by the most modern cost-saving methods.

If other compressor mountings were equally effective, not being so economically manufactured they would have to cost you more—for no greater value.

The Curtis Portable Compressor, both powered and propelled by Fordson, is likewise the most economical to *operate;* while its extreme *mobility* is a valuable added advantage for which you pay nothing extra.

So fundamental are the advantages of this unit; so radical its cost savings; so versatile its ability to handle various kinds of work; that contractors are finding it the one best compressor unit on which to *standardize,* taking the place of other types.

No matter what kind of work you do requiring compressed air, you should purchase no additional equipment without first thoroughly investigating the low-priced Curtis Portable Compressor.

List Price, Curtis Unit Only (STEEL WHEELS) $900 SUBJECT TO DISCOUNT

MAIL COUPON TODAY

CURTIS Pneumatic Machinery Co.
1931 Kienlen Ave., St. Louis
Branch Office, 518-I Hudson Terminal, N. Y.

Gentlemen:
Please send at once full information about the Curtis Portable Compressor, powered and propelled by Fordson tractor. I prefer to deal through [dealer].

Name.....
Address.....
Write character of work in margin or by letter.

CURTIS COMPRESSOR PORTABLE

Both powered and propelled by Fordson Tractor

CURTIS PNEUMATIC MACHINERY COMPANY, ST. LOUIS, U.S.A.

Legal Points for Contractors

These brief abstracts of court decisions in the contracting fields may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt, consult your own lawyer

Edited by A. L. H. Street, Attorney-at-Law

Damages Recoverable When Owner Breaks Contract

To how much money is a contractor entitled when one who has contracted work to him abandons the project before the contractor has furnished any labor or materials? The answer to this question, under ordinary circumstances, may be found in a recent decision of the Arkansas Supreme Court (Sternberg Dredging Company vs. Dawson, 285 South Western Reporter, 32). It was decided in that case that where a subcontractor was prevented from proceeding under his agreement with the contractor, the measure of damage was the difference between the contract price of the work and any lower amount representing the reasonable cost of doing the work at the time it should have been done. There is no reason why the same measure of damage should not be applied to the claim of a general contractor against the owner.

Noncompliance with Construction Contract Was Not Excused

That a supervising engineer has no right to give away rights belonging to his principal under a construction contract is the main rule of law on which the decision of the New Jersey Court of Errors and Appeals in the case of Borough of Deal vs. Sieling, 133 Atlantic Reporter, 409, rests.

The borough awarded a contract for the building of a jetty on an ocean-front. The contractor shortened the piling and sheathing over the lengths required by the contract. After the work was completed, accepted, and paid for, a storm washed out part of the structure. The borough was allowed to recover damages against the contractor and his surety. The following is the meat of the Court's decision:

Even if the borough's engineer consented to shortening of the piling and sheathing, a disputed fact, the consent was not binding upon the borough. "The agent of a corporation has no power by virtue of his agency to alter the provisions of a formal written agreement entered into by the corporation whose agent he is."

The borough's acceptance of the work, on the engineer's certificate that the work had been completed according to contract, did not bar the borough from claiming damages, because the contract provided that the final "payment should not be considered as releasing the contractor from obligations to remove and make good defective work and materials when discovered at any time."

The Law Protects Contract Rights as Much as Physical Property

A mob organized to destroy a building could, of course, be restrained by court order from carrying out the conspiracy. That is a proposition that is probably understood by laymen as well as lawyers. And yet there is a widespread misconception that the law affords no redress against malicious attempts to destroy contract rights. Decisions handed down from time to time by the courts are serving to show that the law safeguards contract rights, as well as property, against wrongful interference. The trend of judicial decision is well illustrated by the decision of the United States District Court for the Northern District, Eastern Division, of Ohio, in the case of J. C. McFarland Company vs. O'Brien, 6 Federal Reporter, 2d Series, 1016.

This case presented an application by a building subcontractor for an injunction against journeymen painters' unions and a general contractor carrying out a claimed conspiracy to coerce the subcontractor to employ union workers. Under the peculiar facts of the case, it was decided that there was no right to an injunction, but the Court laid down these general principles of law:

A subcontract is property. "In law it is entitled to protection on the same basis and under the same rules as is one's dwelling house." The officers of a trade union have no more right to conspire or agree to deprive a contractor or subcontractor of his property in a contract than they would have to conspire and agree to deprive him of a building. A general contractor cannot excuse his participation in a conspiracy to compel a subcontractor to employ union labor on the ground that he acted unwillingly and with a view to protecting himself against financial loss.

Unions have no right to coerce a contractor to join their conspiracy under threat of withdrawing their members from working for other subcontractors.

A contractor or subcontractor has the full right to employ any competent workmen, whether members of a union or not.

Unions and members have the right to procure work by the same methods as other workers. "It is true that they have the right to combine and act through agents selected by themselves to apply for . . . work and bargain collectively as to the terms upon which it is to be done, but the combined right is, in law, no greater than the right of a single worker."

Made to Match "CATERPILLAR" RUGGEDNESS!

FULL CREDIT for "Caterpillar" performance is due the stout implements for road-building and dirt-moving today offered by scores of manufacturers.

Strength and stamina in design and construction of scraper, grader, scarifier, bull-dozer and road plow take full advantage of the power of "Caterpillar" track type tractors!

A "Caterpillar" outfit achieves a notable economy of operation because there is no weak link between power generated and work performed.

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How to Lose Mechanic's Lien Rights

A contractor gave materialmen checks on a bank in which he had no funds in payment for materials used in constructing a building. The materialmen, without first ascertaining whether or not the checks were good, gave the contractor receipts for payment of the bills, so that he could induce the owner to pay the contract price. The contractor collected and then left town, forgetting to make the checks good and to leave his new address. The materialmen then sought to back up and enforce liens against the property. But the Ohio Court of Appeals said (Botzum Brothers Company vs. Brandau, 152 North Eastern Reporter, 727):

"The owner and the lien claimants were all innocent parties. The wrongful and fraudulent conduct of . . . the contractor has resulted in damage. The active conduct of the lien claimants in furnishing the contractor with written receipts, showing that they had received their pay in full, enabled him to defraud the owner. Under such circumstances, they ought, in justice and equity, to be estopped from asserting their claims against the owner."

The Terms of a Public Contract Must Closely Follow Terms of Bidding

Where the laws of a state require that contracts for public work be awarded to the lowest responsible bidder, no valid agreement is made unless its terms substantially follow the terms on which bids were received. All the courts recognize this rule, because there would be no fairness in the awarding of such contracts if the requirements made in doing the work, or the pay to be received, could be changed after the bids were received, without any readvertisement for bids.

A practical illustration of the working of the rule was made lately by the Iowa Supreme Court in the case of Cjellefald vs. Hunt, 210 North Western Reporter, 122. In that case the notice and specifications on which bids for the construction of a drainage ditch were received did not provide for extra pay in case quicksand should be encountered, but a contract allowing such pay was awarded to the successful bidder. The Court held that the contract was void and the contractor was denied right to recover a balance due on the contract price. The opinion says:

"The whole theory of awarding public contracts to the lowest bidder, after advertising therefor, is to protect the interest of the property owners, and to create competition between the bidders, to the end that the work may be done as cheaply as possible. In order that such bidders shall be able to compete on equal terms there must be established in advance a fixed basis for comparison of bids so that all may bid on the same thing. . . .

"Additional stipulation contained in municipal contracts which were not mentioned in the published notice for bidding and which constitute a material change, and therefore a departure from the basis of bidding, invalidates the contract."

Delays in Cashing Checks Are Dangerous

A paving contractor residing at Joplin, Mo., did work for a Springfield, Mo., firm. He received a check in Springfield, drawn by the firm on a Springfield bank, in settlement. This was on Friday. The same day he mailed the check back to the firm, claiming that he was entitled to an additional credit of $11.02. On receiving the check back in Saturday's mail, the firm remailed it to the contractor, drawing attention to the fact that the claim for an additional credit was erroneous. He then deposited the check in a Joplin bank, which forwarded it to a Springfield bank other than the one on which it was drawn. It arrived in Springfield Tuesday morning, but the drawee bank failed to open its doors that morning.

In the case of Kock vs. Sanford Loan & Realty Company, 286 South Western Reporter, 732, the Springfield, Mo., Court of Appeals decided that the contractor was the loser, as against the firm which drew the check, saying:

"Where the payee receives the check where the drawee bank is located it is his duty to present it not later than the closing banking hours on the following business day. Had plaintiff [the contractor] observed this duty the check would have been presented and paid."

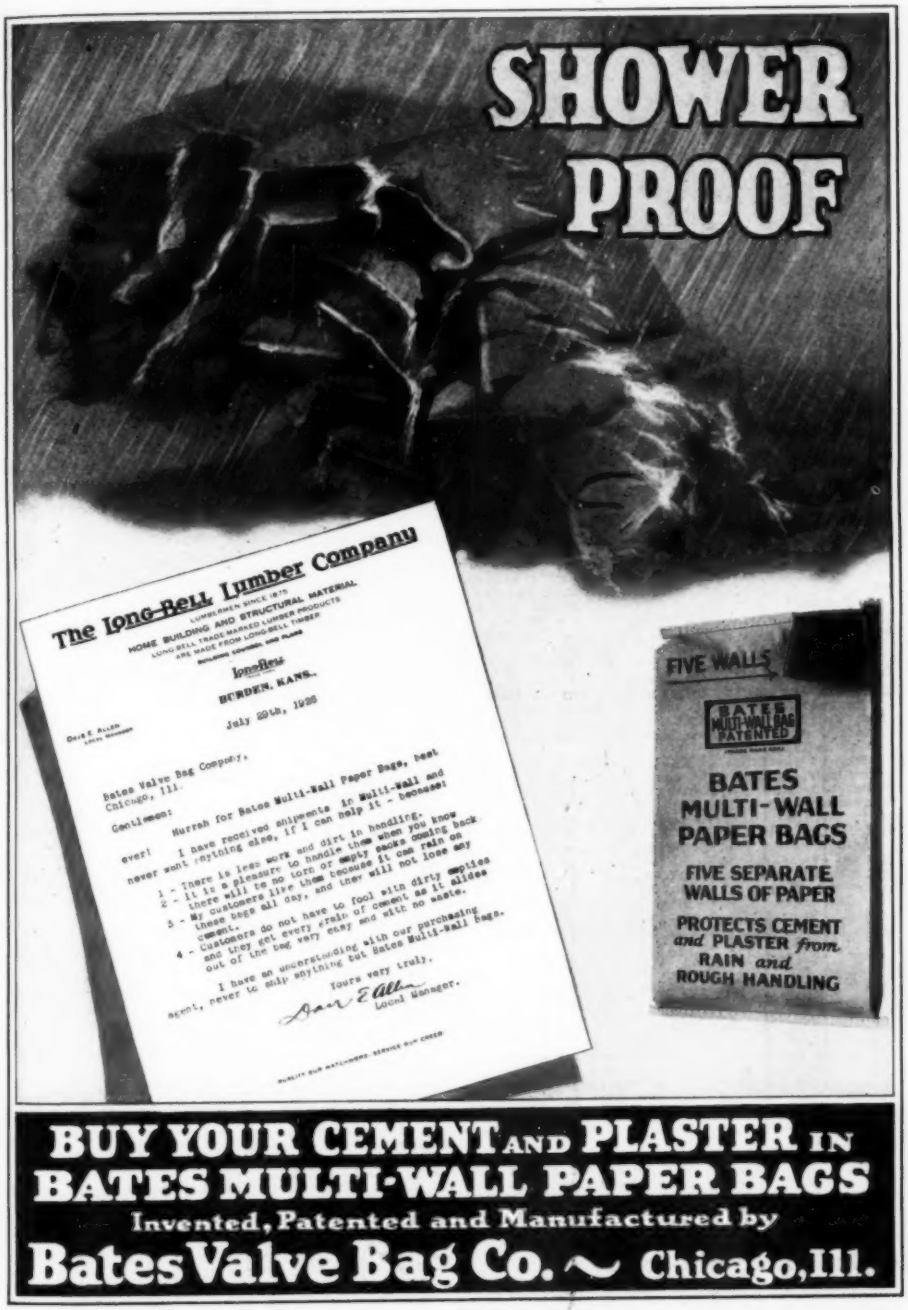
It was further decided that the contractor could not excuse the delay on account of having returned the check for the correction to which he erroneously assumed he was entitled.

What the Highway Contractor's Bond Covers

On one hand, it is plain enough that a highway contractor's bond to pay for materials used on a job does not make his surety liable for neckties worn by the contractor. On the other hand, it is equally clear that the bond does cover cement, sand, etc., incorporated into the work pursuant to contract. Between these two extremes is a twilight zone in which the courts sometimes find difficulty in determining whether or not certain things are covered by such a bond.

In the recent case of Franzen vs. Southern Surety Company, 246 Pacific Reporter, 30, the Wyoming Supreme Court decided that a highway contractor's bond given under the local statutes covered feed furnished for horses used on the contract work, fuel to run machinery, oil to light the laborers' camp, etc., but not overshoes furnished to the contractors' and their men although they were worn on the job. The Court said:

"We think that where labor or material furnished is necessary, or even proper, for the execution of any particular work, under a contract like that in the case at bar, and the furnishing of such labor and material may be fairly held to have been in contemplation of the parties when executing the contract and the bond therefor, and the same is of a nature so as to be necessarily wholly consumed in the particular work, then it is protected under a contract and bond like those in this case."


SHOWER
PROOF
The Long-Bell Lumber Company
LUMBERMEN SINCE 1875
HOME BUILDING AND STRUCTURAL MATERIAL
LONG-BELL TRADE MARKED LUMBER PRODUCTS
ARE MADE FROM LONG-BELL TIMBER
BUILDING COUNSEL AND PLANS
LongBell
OLNEY, KANS.
July 29th, 1926
Bates Valve Bag Company,
Chicago, Ill.
Gentlemen:
Hurrah for Bates Multi-Wall Paper Bags, best
ever! I have received shipments in Multi-Wall and
never want anything else, if I can help it - because:
1 - There is less work and dirt in handling.
2 - It is a pleasure to handle them when you know
there will be no torn or empty sacks coming back
3 - My customers like them because it can rain on
these bags all day, and they will not lose any
cement.
4 - Customers do not have to fool with dirty empties
and they get every grain of cement as it slides
out of the bag very easy and with no waste.
I have an understanding with our purchasing
agent, never to ask anything but Bates Multi-Wall bags.
Yours very truly,
Local Manager.
FIVE WALLS
BATES MULTI-WALL BAG PATENTED
BATES
MULTI-WALL
PAPER BAGS
FIVE SEPARATE
WALLS OF PAPER
PROTECTS CEMENT
and PLASTER from
RAIN and
ROUGH HANDLING
BUY YOUR CEMENT AND PLASTER IN
BATES MULTI-WALL PAPER BAGS
Invented, Patented and Manufactured by
Bates Valve Bag Co. ~ Chicago, Ill.

These Catalogs are Useful

THE catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.

A COMPLETE ALL-PURPOSE PORTABLE HOISTING ENGINE

The Erated Hyster is a complete, compact, standardized general purpose hoisting engine installed for power and portability on the front end of a Fordson tractor. A complete description of this unit, which competes with heavy, costly, unwieldy, stationary hoists, may be secured from the Erated Machinery Mfg. Co., Portland, Ore.

A BACKFILLER EXTENSION THAT LOWERS COSTS

The Miami back-filler extension for the Fordson tractor and the Miami power winch will lower backfilling and berm-building costs. A free circular describing the operation and uses of the extension and power winch in detail may be secured from the Miami Trailer-Scraper Co., 610 S. Clay St., Troy, Ohio.

SELF-CENTERING CAST IRON PIPE

De Lavaud centrifugal pipe, which is self-centering and easy to lay and which may be purchased equipped with bell and plain-end joints, is described in the literature and specifications which may be secured from the U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.

A COLORED SURFACE-CONCRETE HARDENER

The Master Builders Co., 7016 Euclid Ave., Cleveland, Ohio, has recently announced Dycrome, a method and material that produces hardened concrete floors in colors by surface treatment. A circular showing the colors and describing the method may be secured from the manufacturer.

A TWIN-CYLINDER UNDERBODY HOIST

Heil Hoist Bulletin 160, which is a most useful piece of literature for truck owners, describes the Heil twin-cylinder hoist for motor trucks. Get your copy by writing to the Heil Co., 1243 26th Ave., Milwaukee, Wis.

EVERYTHING YOU WANT IN ONE EXCAVATOR

There is no use fooling around when considering the question of excavators. "Go to Byers and get a Bear Cat;" that's what one contractor says. It's got speed, power and economical operation. A description of it will be found in the new Bear Cat Book published by the Byers Machine Co., Ravenna, Ohio.

LARGE GASOLINE-OPERATED RAILROAD-TYPE CRANES

Every contractor knows the advantages of gasoline operation. The Orton Crane & Shovel Co., 608 S. Dearborn St., Chicago, Ill., has applied this to large railroad-type cranes and tells all about it in Catalog No. 37, which may be secured free on request.

A MOTOR ASPHALT HEATER AND DISTRIBUTOR

Any contractor interested in securing information on an asphalt and tar heater and distributor which has covered more miles than any other heater and distributor in the world, should write to the Kinney Mfg. Co., Boston, Mass., to secure the literature on the Kinney positive-pressure pump and Kinney spraying nozzles, which are mounted with tanks on trucks to facilitate rapid spreading.

STEEL FORMS

Before you plan your next job and before you send in your bid, it will be to your advantage to get the advice of an organization with twenty years of experience in designing and building steel forms. The Blaw-Knox Co., 667 Farmers' Bank Bldg., Pittsburgh, Pa., will gladly send this information and the Blaw-Knox catalog, on request.

A PLASTER MIXER THAT SHOVELS

With a Blystone, the only plaster mixer that shovels, you can underbid your competitor without reducing your profits, save the daily wages of a laborer, and get 100 per cent thoroughness in every batch. For information and prices regarding this mixer, write to the Blystone Mfg. Co., 1226-C St., Cambridge Springs, Pa.

PUMPING UNITS AND MIXERS

Detailed descriptions regarding Lauson "Quality" pumping units and mixers, which are powered by the Lauson engine, may be secured without obligation from the John Lauson Mfg. Co., 11 Jackson St., New Holstein, Wis.

WHERE BUILDING BEGINS

The saw rig is where the building begins, where the countless pieces of lumber needed to build the forms and numerous other jobs are sawed, and LeRoi engines provide dependable power which keeps the saw buzzing and the crew stepping lively. For information and prices regarding LeRoi engines, write to the LeRoi Co., Milwaukee, Wis.

DRIVING PILES UNDER WATER

Bulletin 35, issued by the McKiernan-Terry Drill Co., 19 Park Row, New York, contains sixty pictures of interesting pile-driving operations from the heaviest concrete monoliths to the lightest steel and wood sheeting. It is yours for the asking.

A ONE-YARD, HEAVY-DUTY GAS OR ELECTRIC SHOVEL

The Osgood Co., Marion, Ohio, has just issued a new bulletin No. 2620, entitled "Osgood Money Savers," which completely describes the Osgood one-yard, heavy-duty gasoline or electric shovels, cranes, back hoes and draglines.

CONTRACTORS' BOILER PROBLEMS SOLVED

If you have boiler problems of any kind whatsoever, connected with your contracting machinery, send a word regarding them to Johnston Brothers, Inc., Ferrysburg, Mich., and they will be glad to send you helpful information.

GREATER ECONOMY IN INSIDE WALL-FORMS

M & M sheeting darts, which are designed to attach the inside wall-forms to the wood sheeting used to support an adjacent street or property, and which have proved very economical in this type of construction, are described in Folder C-32 which may be secured from the M & M Wire Clamp Co., 2 S.E. Fifth St., Minneapolis, Minn.

STEEL TRENCH BRACES

Simplex trench braces, which are made of steel and malleable iron and may be secured complete with pipe, or as fittings without pipe, or made up for use with timber braces and which have ball and socket joints at each end permitting quick adjustment and tight gripping at all angles, are completely described in Circular 1126 which may be secured from Templeton, Kenly & Co., Ltd., 1020 S. Central Ave., Chicago, Ill.

TYPICAL INSTALLATION OF A LIGHT POWER SHOVEL

The Universal Power Shovel Co., 15841 Second Blvd., Detroit, Mich., has recently issued an illustrated circular depicting a few typical installations of the Wilford power shovel which is one-man operated, has a 13-foot boom with high lift and reach, a quarter-circle swing, turns in its own length and is well-built, using the Fordson tractor as a power unit.

ALL-STEEL SCRAPERS

The Beach Manufacturing Co., Charlotte, Mich., which manufactures "everything for roads," will be pleased to send full information and prices regarding the "Beach" all-steel self-loading scraper, which it is claimed will outwear a dozen board scrapers.

A NEW LOADER AT A NEW PRICE

The loader folder issued by the Barber-Greene Co., 485 West Park Ave., Aurora, Ill., which will be sent on request, describes the new Barber-Greene "25" bucket loader, which differs only in size and capacity from the Barber-Greene "42" and sells for a price that helps it to replace hand labor on the smaller jobs at a decided profit.

The advent of high-powered engines, road rollers, trucks, tractors, etc., made it necessary for the contractor and road-builder to have a "Super Plow."

We have built such a Plow and it is known as

WIARD'S "2 in 1"
ROAD OR CONTRACTORS' PLOW

This Plow is intended for use with animal power, traction engine, road roller, drag line or other power. Its weight, with Clevis, is 315 pounds.

We guarantee the steel beam on this plow against breakage for one year.

The Plow is very simple in construction, consisting of only nine parts, aside from braces and bolts.

For full description, see our booklet.

The
WIARD PLOW COMPANY
Oldest Plow Makers in America
BATAVIA, N. Y.

A STEAM-JACKETED PUMP

The Barber Asphalt Co., Iroquois Sales Dept., Philadelphia, Pa., will be glad to send complete data and specifications on request regarding the entire Iroquois line of road-building machinery, including the Iroquois steam-jacketed pump which is most efficient for pumping asphalt and other viscous materials that will not flow at atmospheric temperatures.

THE GAS SHOVEL OF TODAY AND TOMORROW

The Erie Steam Shovel Co., Erie, Pa., has just issued a new book with 60 large illustrations, describing the Erie Gas + Air shovel and its work. This company will be pleased to send a copy of this book on request to interested contractors.

RESERVE POWER FOR HEAVY HAULING

Without uneconomical overpowering or sacrifice of speed, the GMC 53-horsepower engine and 2-range transmission provide a tremendous reserve power which makes the Big Brute trucks ideal for heavy hauling. Send for literature describing these trucks to the General Motors Truck Co., 5800-6600 W. Dickens Ave., Chicago, Ill.

WIRE TIES AND TOOLS FOR TYING REINFORCING RODS

Bates wire ties and tools for tying concrete reinforcing rods are made by the Bates Valve Bag Co., 8200 S. Chicago Ave., Chicago, Ill., and are completely described in illustrated literature which may be secured from the manufacturer.

DEPENDABLE PUMPS FOR CONTRACTORS

Domestic pumps, which are in daily use in all parts of the world by contractors, builders, municipal departments, etc., and which are dependable under all conditions, are completely described in illustrated bulletins which the Domestic Engine & Pump Co., Shippensburg, Pa., will be pleased to furnish on request.

ELECTRIC CAPSTAN CAR PULLER

If you are interested in an electric capstan car puller which is an effective unit for the use of contractors, sand and gravel plants, stone quarries and in manufacturing plants, write to the Clyde Iron Works Sales Co., Duluth, Minn., for complete information on Clyde units.

A FREE BOOK ON GAS ENGINE LUBRICATION

The Climax Engineering Co., 1 W. 18th Ave., Clinton, Iowa, is distributing free, a revised edition of its "Lubrication Instructions for Climax Trustworthy Engines." This book was originally prepared by the Technical Staff of the Vacuum Oil Company in cooperation with engineers of the Climax Engineering Company and contains reliable lubrication knowledge which is comparatively scarce.

A SMALL TRACTOR-MOUNTED CRANE

The Tractocrane, which is being sold by Thaleg and Hock 236 North Clark St., Chicago, Ill., is a small, quick-acting crane manufactured in two models, using the McCormick-Deering and Fordson tractors as power units. Contractors interested in this unit may secure complete information from the distributors.

SCIENTIFICALLY-ENGINEERED WHEELBARROWS

The Toledo Wheelbarrow Co., Toledo, Ohio, will gladly send its catalog showing Bull Frog barrows, which have perfect balance, shaped handles, smooth-running "Never Break" wheels, and seamless, elevated trays, reinforced angle-iron legs and angle-iron nose guards.

GASOLINE LOCOMOTIVES

The 3-point suspension of the Vulcan gasoline locomotive makes this gear-driven locomotive hold to the rails. Interested contractors should write to the Vulcan Iron Works, Wilkes-Barre, Pa., for its latest Bulletins.

STRETCHING GASOLINE GALLONS

"Ricardo Head Principles," is the title of a booklet telling all about Ricardo heads, which make for economy and power in gasoline engines. A copy of this booklet may be secured without obligation from the Industrial Equipment Division, Waukesha Motor Co., Waukesha, Wis.

STEEL MORTAR BOXES

Catalogs and prices on Akron mortar boxes, in which the ends slope to follow the natural path of the hoe and curve into the bottom, making easier working with no place for the mortar to accumulate and set, may be secured from the Akron Barrow Co., 3140 E. 65th St., Cleveland, Ohio.

CONCRETE MIXERS THAT ARE SPEEDY

The Standard Scale & Supply Corp., Pittsburgh, Pa., will be pleased to send on request a copy of "The Standard" mixer booklet describing the many advantages of "The Standard" mixer, which is manufactured by this company.

ELECTRICALLY-OPERATED, PORTABLE AIR-COMPRESSORS

Sullivan portable air-compressors operated by electric motors available in two sizes, 103 and 206 feet, are completely described in Bulletin 83-E which may be secured from the Sullivan Machinery Co., 162 S. Michigan Ave., Chicago, Ill.

A NEW CATALOG ON DIRT MOVING

Catalog No. 209-A which has recently been issued by the Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., is a veritable text book on dirt moving and also contains complete descriptions of the various models of Baker-Maney self-loading, four-wheel scrapers.

AUTOMATIC GRAVITY-ROCKER DUMPING BODIES

The Anthony Co., Inc., Streator, Ill., has issued a compact, but complete catalog, illustrating and describing its full line of automatic gravity-rocker dumping bodies, gear-controlled hand-hoist dumps, sanitary garbage bodies, seats, cabs and accessories.

ROCK-DRILLING OUTFITS FOR CONTRACTORS

A booklet, "One Hundred and One Ways to Save Money with Portable Air Power," has been prepared by the Ingersoll-Rand Co., 11 Broadway, New York, for the benefit of contractors who need constant, reliable and economic service from air-compressors and tools.

A NEW CONTRACTORS' EQUIPMENT CATALOG

The Heltzel Steel Form & Iron Co., Warren, Ohio, has a new 32-page catalog covering some twenty different pieces of contractors' equipment ready for distribution. This catalog contains information of value to building contractors as well as to contractors who build roads, streets and sidewalks. A copy will be sent to any contractor desiring it by addressing the Heltzel Steel Form & Iron Co., 22 Thomas Road, Warren, Ohio.

LIFT AND FORCE TRENCH PUMPS

Complete details regarding Humphryes lift and force trench pumps, which have been designed to give the maximum service with the minimum amount of expense and delay, and which are ideal pumps for general drainage work, may be secured from the Humphryes Mfg. Co., Mansfield, Ohio.

CORROSION-RESISTING QUALITIES OF COPPER-BEARING STEEL

The Truscon Steel Co., Youngstown, Ohio, has issued a booklet, No. 679, entitled "Copper Bearing Steel Resists Corrosion." This booklet contains facts, figures and photographs showing the marked rust-resisting qualities of steel containing a percentage of copper.

A NEW PAVER CATALOG

In its new catalog No. 25, the Koehring Co., Milwaukee, Wis., has completely described Koehring heavy-duty pavers, with admirable illustrations showing the structural qualities of this equipment, as well as giving specifications and operating details.

TRUCKS FOR ALL HAULING REQUIREMENTS

Complete information and prices on Graham Brothers trucks, which have remarkable records of dollars earned, miles run, and work well done, and which are built in sizes and body styles to fit the needs of your business, may be secured from Graham Bros., Detroit, Mich.

SINGLE- AND DOUBLE-SUCTION PUMPS

The Aldrich Pump Co., Foot of Pine St., Allentown, Pa., will be pleased to send information and prices on Aldrich single- and double-suction, single-stage and multi-stage centrifugal pumps to any contractor who is interested.

SAW RIGS AND HOISTS

Your own woodworking shop right on the job means fast work, no delays, lower bids, and more jobs at greater profit. American woodworkers, which are complete shops in themselves, as well as American saw rigs and hoists, are described in literature which may be secured from the American Saw Mill Machinery Co., 171 Main St., Hackettstown, N. J.

AUTOMATIC AIR-DUMP CARS

The Koppel Industrial Car & Equipment Co., Koppel, Pa., will be pleased to send information and prices on Koppel automatic air-dump cars which discharge clean and clear every time.

ALL-STEEL TRACTOR DUMP-WAGONS

LaPlant-Choate all-steel tractor dump-wagons, which are made in three- and five-yard capacities, as well as a complete line of all-steel bulldozers, extension-reach trailers, heavy transport trailers, and snow-plows for all makes and sizes of motor trucks and tractors, are described in the literature of the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, which may be secured on request.

SNOW REMOVAL IS SPRING MAINTENANCE

Snow removal, on soft roads or hard, is spring maintenance, as it protects the road bed, allowing the snow to melt in the ditch and not on the road, while the distribution of traffic will avoid ruts and chuck holes. The Caterpillar Tractor Co., San Leandro, Calif., will be glad to send literature and information regarding snow removal with Caterpillar tractors to interested contractors and officials.

GASOLINE-DRIVEN EXCAVATORS BUILT OF CAST STEEL

The Harnischfeger Sales Corp., 3819 National Ave., Milwaukee, Wis., has recently issued a new bulletin, 61-X, containing 56 pages and 96 illustrations describing P & H excavators, with all details of construction from the ground up.

HARDSOCG PAVING BREAKER AND WONDER DRILL

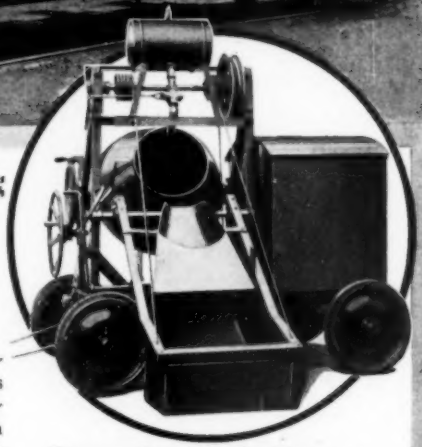
With a **Hardsocg Paving Breaker** you can cut costs 60 to 75 per cent. Because of its extra long stroke, it hits exceedingly hard, and therefore accomplishes a remarkable amount of work in a given time. Its weight is 85 lbs.; length. 27 in.; diameter of hammer, 2 11/16 in.; length of stroke, 4¼ in. Let us send you our circular giving detailed description of this wonderful time-saver.

With a **Hardsocg Wonder Drill** you will save time on any rock-drilling job — no matter how difficult. You will find it a small air-consumer, easy to handle, smooth-running and trouble-free. It has seven less parts than other drills have and the surface of all wearing parts is greater, therefore the upkeep expense is very small. It's a "Wonder." Let us tell you more about it.

HARDSOCG WONDER DRILL CO.
OTTUMWA, IOWA

5 Carloads *to* N.Y. State

The New York State Bureau of Highways purchased Five Carloads like the above through our distributor J. Shuman Hower, Utica



Where Quality Dictates Choice There "Lausons" Are Always Found

Cheap mixers may satisfy the demands of the "contractor" who buys from job to job, but where continual, grueling work like that to which State Highway Departments subject their equipment is the measure of "lasting" qualities, the Lauson offers factors of ruggedness which merit the serious consideration of all buyers of such equipment who want machinery that will last longer than the immediate job in prospect.

Powered with the Famous "Lauson" Engine

— direct, positive gear drive, enclosed in engine housing—dust proof Timken Roller Bearings, running in oil — an exclusive "Lauson" feature — Timken roller bearing wheels — and many other "Super-Quality" features.

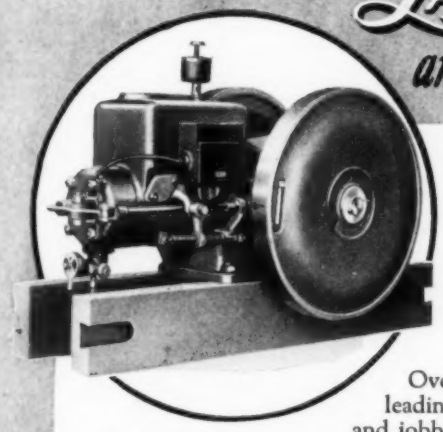
BUY "LAUSON" MIXERS IF YOU ARE AFTER REAL ENDURANCE.

Send for Literature that will show you "Why" Lausons Excel.

THE JOHN LAUSON MFG. CO., *11 Jackson St., New Holstein, Wis.*

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you

LAUSON Engines and Pumping Units



28 Years of Quality Engine Building

The Basis of "Lauson Excellence in Equipment"

Over twenty-eight years of sales to leading agricultural implement dealers and jobbers throughout the world are behind the ever increasing reputation of Lauson Engines for highest quality and enduring performance.

Several years ago they were introduced into the contracting field and have proven their fitness in all sorts of industrial work by their growing popular acceptance. Lauson engines have never been manufactured to meet price competition — their popularity has been built on high quality and smooth running features. Because the cylinders and pistons are ground and honed, they fit perfectly, promoting perfect compression. Wearing parts are case hardened. Due to perfect balancing, these engines run without disagreeable excessive vibration. The disc flywheels afford a safety factor much appreciated. Being neat and compact in size, they are especially suited for industrial work. Lauson Engines are made in appropriate sizes, ranging from 2 to 35 Horse Power in all Types.

"Lausons" are Built Right in Every Detail.

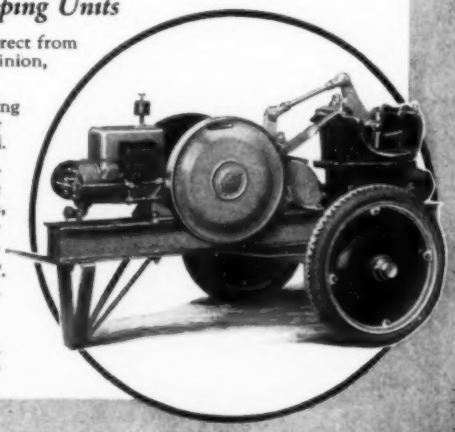
"Quality" Diaphragm Pumping Units

Jack Enclosed—internal gear, driven direct from engine crankshaft, with hardened pinion, gears running in oil.

Provided with connection for installing leading makes of Diaphragm Pumps, or furnished Complete with Pump Specified.

The Jack is especially designed for "Diaphragm" use, the gear drive from the engine is fully enclosed by a shield which, however, leaves the belt pulley conveniently accessible for other work.

Powered with the Lauson Engine—2 H.P. for 3" pump, and 2½ H.P. for 4" pump.



Get Posted on "Lauson" Equipment.

The John Lauson Mfg. Co.
11 Jackson Street New Holstein, Wis.

SESQUI-CENTENNIAL INTERNATIONAL EXPOSITION PHILADELPHIA 1926

Medal of Honor for deLavaud Centrifugal Cast Iron Pipe

THE international jury of awards of the Sesqui-centennial accorded the highest award to deLavaud centrifugal pipe.

This official recognition of the advance that the deLavaud process has brought into the pipe industry will be significant to all engineers and construction experts.

Write for special literature covering the specifications, manufacture and use of deLavaud Centrifugal Cast Iron Pipe.

United States Cast Iron Pipe and Foundry Company

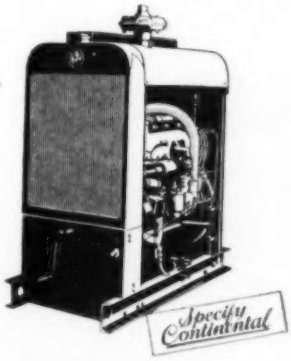
General Offices
Burlington, New Jersey

SALES OFFICES

Philadelphia: 1421 Chestnut St: New York: 71 Broadway
Chicago: 122 So. Michigan Blvd: San Francisco: 3rd & Market Sts:
Birmingham: 1st Ave. & 20th St: Pittsburgh: 6th & Smithfield Sts:
Buffalo: 975 East Ferry Street Dallas: Akard & Commerce Sts:
Cleveland: 1150 East 26th Street Kansas City: 13th & Locust Sts:
Minneapolis: 6th St. & Hennepin Ave:

For Twenty Six Years

A FACTOR IN GASOLINE POWER



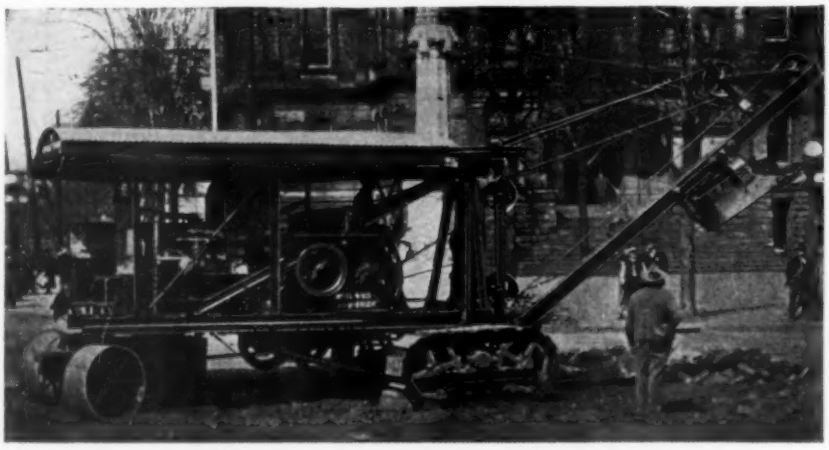
An experience of twenty-six years furnishes the background for the success of Red Seal Continental Motors. Because of this experience the Continental Motors Corporation has been a decided factor in the many phases of gasoline power. These include the industrial field where Red Seal Continental Motors have gained a leading position through superior service to users.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A.
Factories: Detroit and Muskegon

The Largest Exclusive Motor Manufacturer in the World

Continental Motors



The KEYSTONE SKIMMER

TRADE MARK
KEYSTONE
REGISTERED U. S. PATENT OFFICE

The KEYSTONE DITCHER

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

For tearing up old pavement—

The KEYSTONE SKIMMER BUCKET is a heavy and effective scoop of 5/8-yard capacity, carried on six chilled rolls, with a dropping bottom, hinged at the toothed end. Because of its fourteen-foot horiozntal crowd there is no machine like it for shallow repaving jobs, tearing up old concrete, macadam, paving blocks, etc. It is also a rugged "two-fisted" shovel for heavy highway cutting.

KEYSTONE DRILLER CO.

TRADE MARK KEYSTONE REGISTERED U. S. PATENT OFFICE

BEAVER FALLS, PENNSYLVANIA

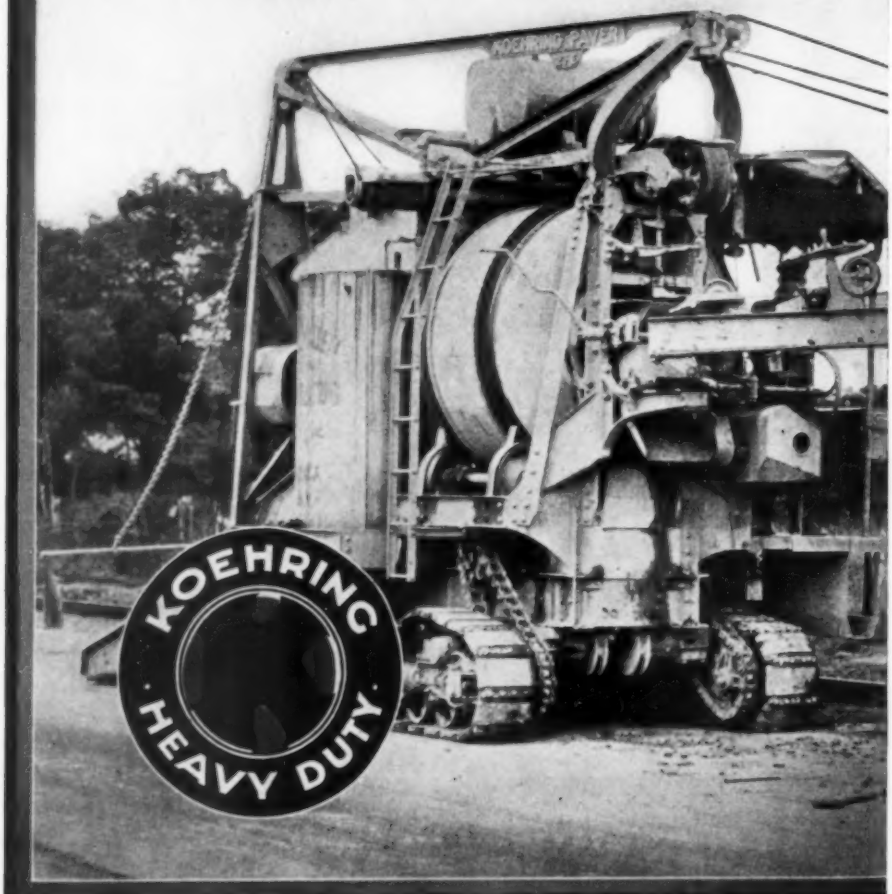
170 BROADWAY, N. Y.—MONADNOCK BLOCK, CHICAGO—JOPLIN, MO.

For ditching and cellar digging—

The KEYSTONE PULL-STROKE DITCHER is a machine which always stands on the solid ground and handles excavations for any width or depth up to twenty feet. The Ditcher also has a bottom hinged at the toothed end, which bottom swings free in dumping. The bucket is self-cleaning, so that even the narrowest bucket (14-inch) can be operated in gumbo and sticky clay. The buckets are manufactured in eight sizes, up to 54 inches.

Heavy

{that means KOEHRING}



Duty!

RACE your records! Score big yardage! Keep it up! Watch that new clean cut road spin out behind! There's downright FUN in THAT! The Koehring is almost human in the way it catches your spirit! It'll give you what you ask — and no burning up, or lying down, because it's built for record-racers! HEAVY DUTY — that means KOEHRING!

How about a catalog? Ask for No.P-6

KOEHRING COMPANY MILWAUKEE WISCONSIN
PAVERS, MIXERS—GASOLINE SHOVELS, CRANES AND DRAGLINES

Sales Offices and Service Warehouses in all principal cities

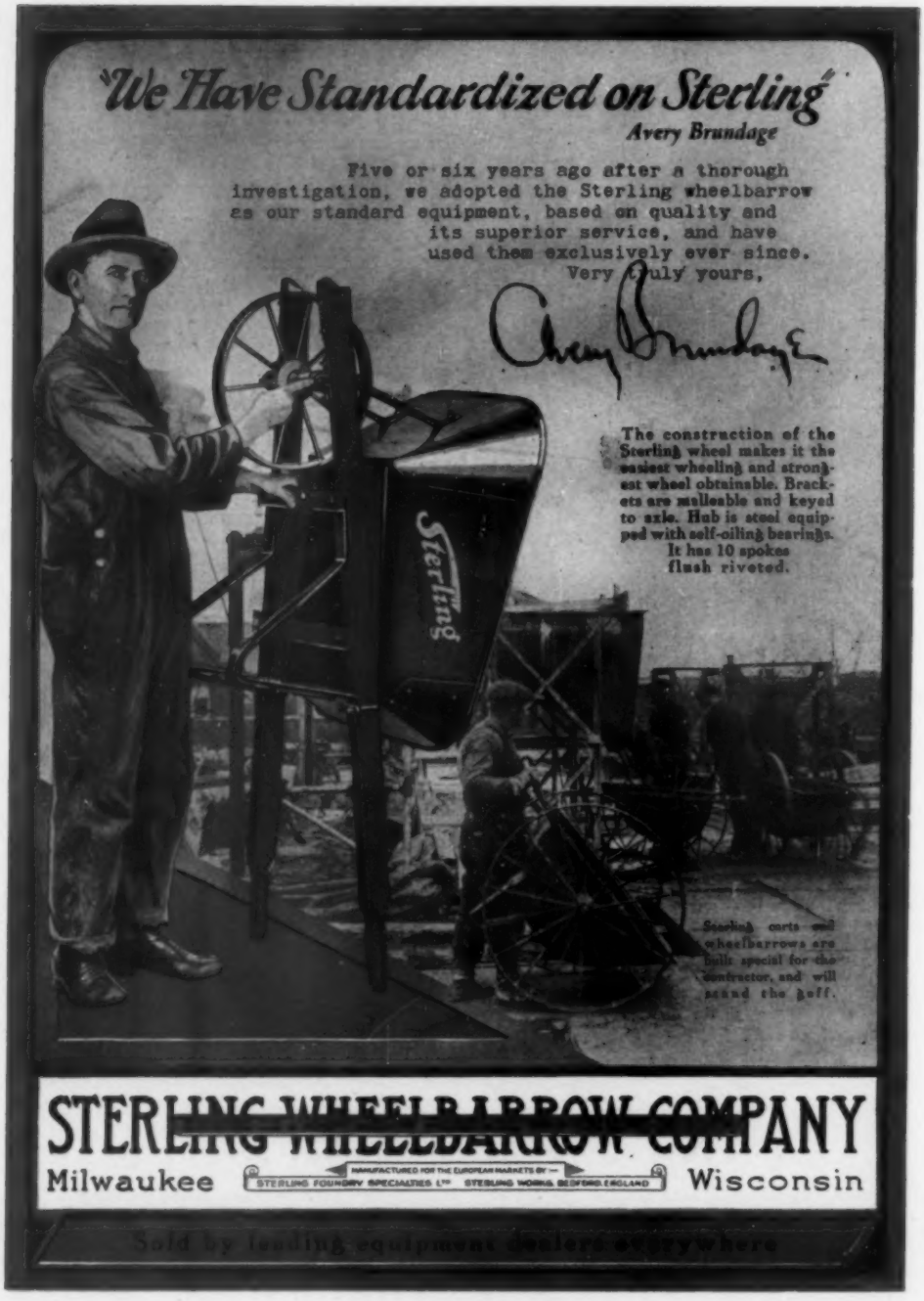
Foreign Department, Room 1350, 50 Church St., New York City.
Mexico, F. S. Lapsm, Cinco De Mayo 21, Mexico, D. F.

SIZES

Pavers—7-E, 13-E, 27-E. Auxiliary equipment and choice of powers to suit individual needs. Complies with A. G. C. Standards.

Construction Mixers—10-S, 14-S, 21-S, 28 S. Steam, gasoline or electric power. Mounted on tracks or skids. Rubber tired wheels optional. 28 S on skids only. Complies with A. G. C. Standards.

7-S Dandie Mixer—Two or four cylinder gasoline engine. Power charging skip, or low charging hopper and platform. Rubber tired steel disc wheels or steel rimmed wheels. Complies with A. G. C. Standards.


"We Have Standardized on Sterling"
Avery Brundage
Five or six years ago after a thorough investigation, we adopted the Sterling wheelbarrow as our standard equipment, based on quality and its superior service, and have used them exclusively ever since.
Very truly yours,
Avery Brundage
The construction of the Sterling wheel makes it the easiest wheeling and strongest wheel obtainable. Brackets are malleable and keyed to axle. Hub is steel equipped with self-oiling bearings. It has 10 spokes flush riveted.
Sterling
Sterling carts and wheelbarrows are built special for the contractor, and will stand the gaff.
STERLING WHEELBARROW COMPANY
Milwaukee
MANUFACTURED FOR THE EUROPEAN MARKETS BY —
STERLING FOUNDRY SPECIALTIES LTD STERLING WORKS, BEDFORD, ENGLAND
Wisconsin
Sold by leading equipment dealers everywhere

The whole gang couldn't do it as well!

One shot lubrication to *every bearing* — Something new for pavers — You'll find it on the Smith

One Man—One Minute

"One-Shot" high pressure lubrication to every bearing from this plunger, conveniently located on the operator's platform, puts the Smith Paver more than ever in a class by itself. You'll find this feature only on the Smith.

ADD this to the other features that have made the Smith 27-E Six Bag Paver so universally popular—*better lubrication*—insured lubrication of every bearing.

And think of the saving in labor—of the time element! The Bowen One-Shot Lubricating System which has been incorporated in the Smith operates directly from the platform—A pull of plunger—about *a second* of *one man's time*—Easy.

Think what this will mean in reduced repair costs, reduced delays, and all around longer life for this already highly superior machine!

Your paver will last longer—work better—save more money on every job—if it's a Smith.

The T. L. SMITH COMPANY

1030 32nd Street, Milwaukee, Wis.

Sales Offices and Service Stations in All Principal Cities

Smith Tilting Mixers are built in the following sizes: 2½, 3½, 5, 7, 10, 14, 21, 28, 40, 56 and 112 cu. ft. per batch; Smith Non-Tilting Mixers: 7, 10, 14, 21 and 28 cu. ft. per batch; Smith Paving Mixers: 27-E.

SMITH 27-E SIX BAG PAVER

Not at the Road Show —and it's NOT Our Fault!

Our application for space to show the Speedcrane at the Road Show was rejected—just as it was rejected last year!! We were told that no space was available, so we couldn't get in!

But—

The following Chicago users of more than 50 Speedcranes will testify as to their simplicity, speed and dependability:

Wisconsin Lime & Cement Co. - Main office: 111 W. Washington	13
American Sand & Gravel Co. - - Main office: 133 W. Washington	8
Consumers Co. - - - - - - - - Main office: 111 W. Washington	8
Garden City Sand Co. - - - - - Main office: 133 W. Washington	4
Lake Sand Corporation - - - - Main office: 133 W. Washington	2
Harry Bairstow - - - - - - - 6110 Ravenswood Ave.	2
H. Guillaume - - - - - - - 1729 Wellington	2
Norris-Ward Coal Co. - - - - - 2626 South Parkway	2
M. Foley & Co. - - - - - - - - 1521 Lyons Street	1
Commonwealth Imp. Co. - - - - Main office: 133 W. Washington	1
R. Chisholm & Co. - - - - - - 1000 S. Karlow Ave.	1
Thos. Moulding Brick Co. - - - Main office: 133 W. Washington	1
Frank Phillips - - - - - - - 18th & Canal St.	1
Central Lime & Cement Co. - - 131 N. Homan Ave.	1
Holland Coal Co. - - - - - - Main office: 608 So. Dearborn St.	1
Jos. Veugelar - - - - - - - 26th & So. Park Ave.	1
Auburn Coal & Material Co. - - 74th & Racine	1
H. J. Mohr & Sons - - - - - Harrison St. & Maple Ave.	1
Otto Balmer - - - - - - - - 445 N. Crawford Ave.	1
Midwest Concrete Pipe Co. - - Main office: City Hall Square Bldg.	1
Henry Hafer & Son Coal Co. - Main office: 343 So. Dearborn St.	1
Harvey Wert - - - - - - - 538 W. 31st Street	1
J. M. Pierson & Co. - - - 1602 Otto Street	1

There Are Over 50 Speedcranes

in Chicago alone that are operating every day and you can see them under actual working conditions throughout the entire show week or before and after. You won't want to buy until you have seen the Speedcrane with its outstanding features of speed, simplicity and dependability.

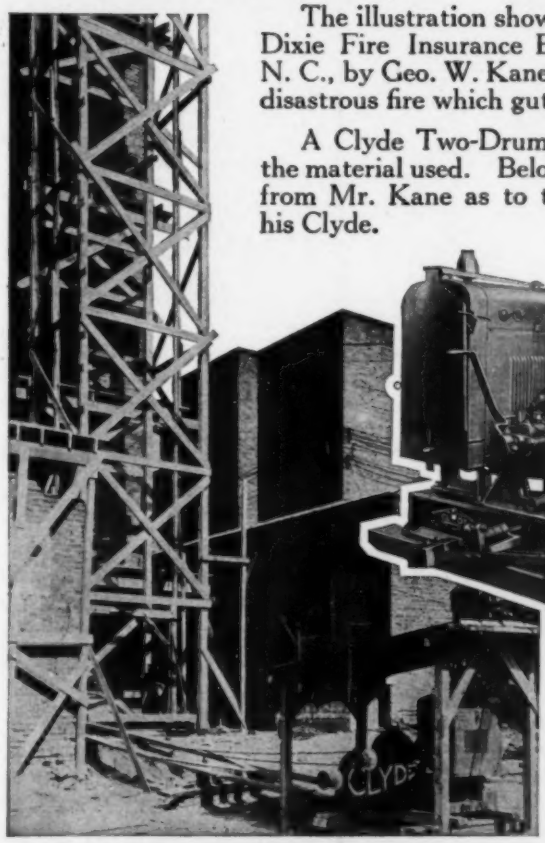
In the panel to the left is a list of Speedcrane owners in Chicago, any of whom will be glad to show you their machines in action.

MOORE SPEEDCRANE COMPANY
33 South LaSalle Street
CHICAGO

MOORE
SPEEDCRANE

CLYDE

Standard Hoists and Derricks
For the General Contractor
STEAM · ELECTRIC · GASOLINE · BELT



The illustration shows the remodeling of the Dixie Fire Insurance Building at Greensboro, N. C., by Geo. W. Kane, contractor, following a disastrous fire which gutted the building.

A Clyde Two-Drum Gas Hoist handled all the material used. Below is given an expression from Mr. Kane as to the sterling qualities of his Clyde.

You'll Take Pride In Your Clyde!

Mr. Kane writes:-

"The Two Drum Clyde Gasoline Hoist you sold me for the Dixie Building job is handling my extra large material elevator cage wonderfully. I am especially delighted with the silent chain feature of this machine. My job was a rush one. I was forced to keep my hoist running for 72 hours without a stop and without a minute's trouble."

CLYDE IRON WORKS SALES COMPANY

Sole Distributors for CLYDE IRON WORKS, Duluth, U. S. A.

Stocks Carried in the Following Warehouses:

NEW ORLEANS	NEW YORK CITY	PORTLAND, ORE.	SEATTLE
909 Magazine St	E. 136 St. and Locust Ave.	555 Thurman St.	3410 First Ave. So.

Branch Offices:

CHICAGO	CINCINNATI	MEMPHIS	JACKSONVILLE	SAN FRANCISCO
11 So. La Salle St.	1913 Union Cent. Bldg.	69 Union Ave.	43-45 W. Forsyth St.	737 Monadnock Bldg.

NEW

A LITTLE BROTHER TO THE

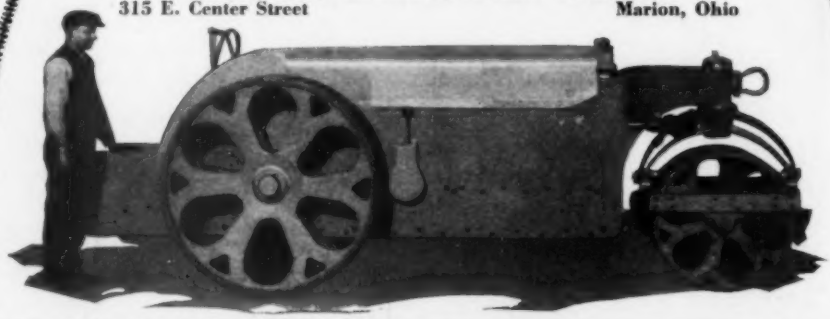
BIG HUBER ROLLER

Not a roller attachment thrown around a light, cheap tractor, but a real hard-working roller built from the ground up as a roller with Standard Roller Controls. This latest addition to the Huber Family now makes available 4 sizes—5, 7, 10 and 12 tons in the 4-Cylinder, enclosed-gear, roller-bearing Huber Rollers.

Send for full particulars.

THE HUBER MANUFACTURING COMPANY

315 E. Center Street — Marion, Ohio



MIXER SALESMEN WANTED

WE have an excellent opening for two traveling field managers, and we would like to hear from salesmen with clean records who are open to a position with us. Give complete details in your first letter. All correspondence will be held confidential.

SEE NEW JAEGER ANNOUNCEMENT IN THIS ISSUE

EQUIPMENT DISTRIBUTORS

THE Jaeger line is open in a few very desirable locations and we invite those who have not already completed 1927 contracts to write us for our proposition.

Look about you and you will find the distributors who have been the most successful are the men who have grown with Jaeger, who builds more mixers today than any other manufacturer.

THE JAEGER MACHINE COMPANY

701 Dublin Road — **Columbus, Ohio**

TWIN BACKFILLER

BACKFILLS
SHOULDERS-ROADS
CLEANS DITCHES
EXCAVATES

On any contract where you can use one or *two* scrapers this machine will pay for itself.

This unit mounted on a Fordson has made many friends—because of its many uses—because it stands up and does its work under all conditions—and because it SAVES REAL MONEY.

Let us send you our catalog

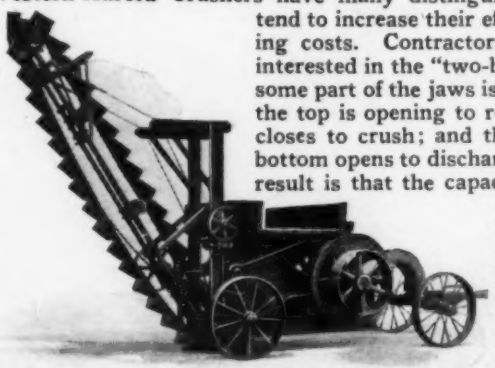
THE WATERMAN CORPORATION

687 East Fort Street **Detroit, Mich.**

WESTERN-AURORA

The Jaw Crusher that is Different

Western-Aurora Crushers have many distinguishing characteristics which tend to increase their efficiency and decrease operating costs. Contractors, however, are particularly interested in the "two-blow stroke" feature whereby some part of the jaws is crushing at all times. While the top is opening to receive new stone the bottom closes to crush; and then when the top closes the bottom opens to discharge the finished product. The result is that the capacity is greatly increased, the vibration is decreased, and less operating power is required; all of which means lower operating costs and increased profits.



A special catalog describes Western-Aurora Crushers in detail. Write for your copy today!

THE AUSTIN WESTERN ROAD MACHINERY CO.

400 North Michigan Avenue **Chicago, Illinois**

Heil Model 11 Steel Dump Body fitted with swinging partition and mounted with a No. 5 Heil Hoist on a 3½-ton truck.

What's New With HEIL?

Look for Heil at the Road Show. Make the Heil Exhibit (Space A19) your headquarters. Leadership of Heil products is again insured for the New Year. The Road Show has been chosen as the place to make an announcement which is bound to excite more comment among dump truck owners than anything since the time Heil placed the first underbody hoist on the market.

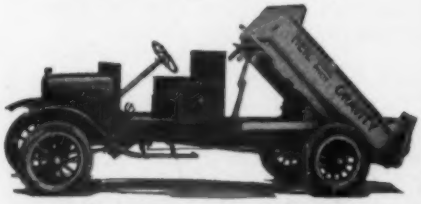
THE HEIL CO.

1242-60 26th Ave. Milwaukee, Wis.

One of our Twenty-five distributors is near you.

Factory Branches:

Chicago, Philadelphia, Boston, New York



The Heil Dual-Pivot Gravity Body Model 105 will be on exhibition at the Road Show. It has a capacity of 1 cu. yd. which can be increased to 1⅓ cu. yd. by additional sides. Model 105 Bodies are carried in stock ready for immediate delivery.

Mack

A Strangle Hold on Hauling Costs

ALWAYS NOTE THE PREDOMINANCE OF MACKS WHERE THE GOING IS HARD.

IN EVERY INSTANCE, PROFITS CAN ONLY PARALLEL PERFORMANCE

MACK TRUCKS, INC.
INTERNATIONAL MOTOR COMPANY
25 Broadway New York City

PERFORMANCE COUNTS

ROAD MAKING or Maintaining

For Every Operation There is a Machine Equipped with

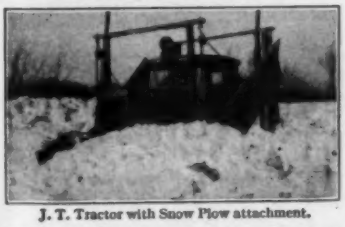
CLIMAX Trade Mark Reg. U.S. Pat. Off.

The "Trustworthy" Engine

McMyler-Interstate No. 2 Gas Shovel at work on the job.

Tearing up old Macadam Road with Galion 4-cylinder Motor Roller with Scarifier attachment.

Plymouth 8-Ton Gasoline Locomotive made by Fate-Root-Heath Co., Plymouth, Ohio.



J. T. Tractor with Snow Plow attachment.

These reliable manufacturers use Climax "Trustworthy" Engines as Standard Equipment.

Shovels and Cranes

Austin Mach. Corp., Muskegon, Mich.
Bay City Dredge Wks., Bay City, Mich.
Brown Hoist. Mach. Co., Cleveland, O.
Industrial Works, Bay City, Mich.
Keystone Driller Co., Beaver Falls, Pa.
Link-Belt Co., Chicago, Ill.
Locomotive Crane Company of America, Champaign, Ill.
McMyler-Interstate Co., Cleveland, O.
Orton Crane & Shovel Co., Chicago, Ill.
The Russell & Co., Massillon, Ohio

Hoists

Lidgerwood Mfg. Co., New York, N. Y.
O. K. Clutch & Mach. Co., Columbia, Pa.

Tractors

Four Drive Trac. Co., Big Rapids, Mich.
Kennison Mfg. Co., Solomon, Kans.
J. T. Tractor Co., Cleveland, Ohio
Wis. Farm Trac. Co., Sauk City, Wis.

Gasoline Locomotives

Davenport Loco. Wks., Davenport, Ia.
Fate-Root-Heath Co., Plymouth, Ohio
Mid-West Loco. Wks., Cincinnati, Ohio
Milwaukee Loco. Mfg. Co., Milwaukee, Wis.
Vulcan Iron Works, Wilkes-Barre, Pa.
Geo. D. Whitcomb Co., Rochelle, Ill.

Ditchers

Greiman Ditcher Co., Garner, Iowa
Parsons Co., Newton, Iowa

Rollers and Scarifiers

Galion Iron Wks. & Mfg. Co., Galion, O

Air Compressors

Mundie Manufacturing Co., Peru, Ill.
Rix Compressed Air & Drill Co., San Francisco, Calif.
Buhl Co., Chicago, Ill.

Also Portable Power Units for Every Purpose

The "Trustworthy" Engines supplied by us to the above list of well-known builders of high-grade machinery, are also available in 17 different types of Portable and Semi-Portable Power Units for every purpose, where from 25 to 140 H. P. is required.

Write for Bulletin E

CLIMAX ENGINEERING CO.

1 W. 18th Avenue **CLINTON, IOWA**

Eastern Branch: 30 E. 42nd St., New York, N. Y.
Cleveland Branch: 657 Leader Bldg., Cleveland, Ohio
Chicago Branch: 2007 Harris Trust Bldg., Chicago, Ill.
El Paso, Texas: Sheehan & Co., 1516 Bassett Ave.
New Orleans, La.: Woodward, Wight & Co., 451 Howard St.
Southwestern Branch: P. J. Dasey, Hotel Wells, Tulsa, Okla.
Los Angeles, Calif.: Coast Machinery Corp., 464-66 E. 3rd St.
San Francisco, Calif.: Coast Machinery Corp., 829 Folsom St.
Birmingham, Ala.: Keiser-Geismer Engr. Co., 1308-9 American Trust Bldg.
Boston, Mass.: Rapp-Huckins, 59 Haverhill St.
Denver, Colo.: The Hendrie & Bolthoff Mfg. & Supply Co., 1621-39 17th St.
Jackson, Miss.: Anderson Sales & Distributing Co.
Indianapolis, Ind.: Carl Dunning Supply Co., 204 W. Maryland St.
Jacksonville, Fla.: Construction Equipment Co., 437 East Bay St.
Madison, Wis.: Wisconsin Machine & Foundry Co.
Minneapolis, Minn.: Wm. H. Ziegler Co., 619 Washington Ave. S.
Portland, Ore.: J. L. Latture Equipment Co., 354 Belmont St.
St. Louis, Mo.: Tulley Equipment Co., 2339 Pine Street.
Omaha, Neb.: Interstate Machinery & Supply Co.
Montreal, Que., Can.: Edward C. Dingman, 1005 Keefer Bldg.
Louisville, Ky.: Beinap Hardware Co.

Visit our Exhibit at the National Road Show, Chicago, Jan. 10-14, 1927, Booths W-11 and W-12.

ALL signs indicate that the 1927 Good Roads Show will be the biggest and best of all.

As usual we shall be there to greet you. Come and see us.

Coliseum, Chicago
January 10-14

Write for Catalog and illustrated folder on method of operation

WOOD HYDRAULIC HOIST & BODY COMPANY

7938 Riopelle Street — *World's Largest Builder of Hydraulic Hoists and Steel Dump Bodies* — Detroit, Michigan

USE

ALAMO ENGINES

ON

YOUR EQUIPMENT

Alamo Engines develop their full rated Horse Power, and 10 per cent overload.

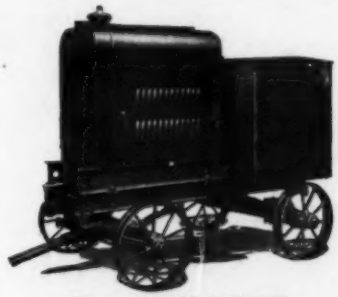
Any equipment manufacturer will be glad to furnish you an Alamo Driven Outfit.

Write for folder

THE ALAMO ENGINE CO.
HILLSDALE MICH., U. S. A.

Builders of
Vertical and Horizontal Engines, in sizes from 1½ to 15 H.P., inclusive.

MR. ROAD BUILDER! INVESTIGATE THIS---



"Domestic" 35-A GIANT Triplex Road Pump

The new "Domestic" GIANT Triplex Road Pump will be on exhibit at the Road Show.

Call at Booths E 16-17 and allow our representatives to show you this new high-pressure, large-capacity, dirt-proof, self-oiling Pump.

The "Domestic" GIANT Triplex Pump has capacity sufficient to meet maximum water requirements of any concrete road job.

— Let us send you descriptive bulletin 26-FC —

"Visit our exhibit at the Convention and Road Show, Chicago, Jan. 10-14."

DOMESTIC ENGINE & PUMP CO.
SHIPPENSBURG, PENNA.

RECENT BUYERS
That the Koppel Automatic Air Dump Car is really a better car is strikingly illustrated by the number of contractors, railroads and other large users who have selected these cars in preference to all others.
Send for Bulletins.
Koppel Industrial Car & Equipment Co.
Koppel, Penna.
New York Chicago Pittsburgh San Francisco

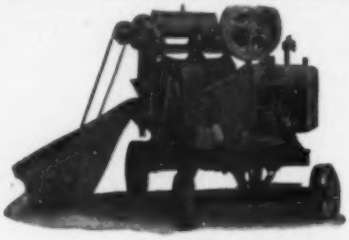
DOBBIE

Derricks and Winches

Complete Stock of Fittings and Winches on hand at all times.

Write for our complete Catalog No. 22.

Dobbie Foundry & Machine Company
Niagara Falls, N. Y.



Atlas YARDAGE

120 to 150 Cu. Yds. in 10 hours with an Atlas one bag Mixer.

Atlas Mixers are of sturdy dependable construction, and the 7-S is regularly equipped with multiple cylinder LeRoi Engine, giving excess power.

We build 3½ ft., ½ bag, 1 bag and 2 bag Mixers.

Dealers write for agency proposition.

ATLAS ENGINEERING COMPANY
3036 GALENA STREET, MILWAUKEE, WIS.

"PENNSYLVANIA" PORTLAND

Pennsylvania Cement

:-: **QUALITY** :-: **SERVICE** :-:

PENNSYLVANIA - DIXIE CEMENT CORPORATION

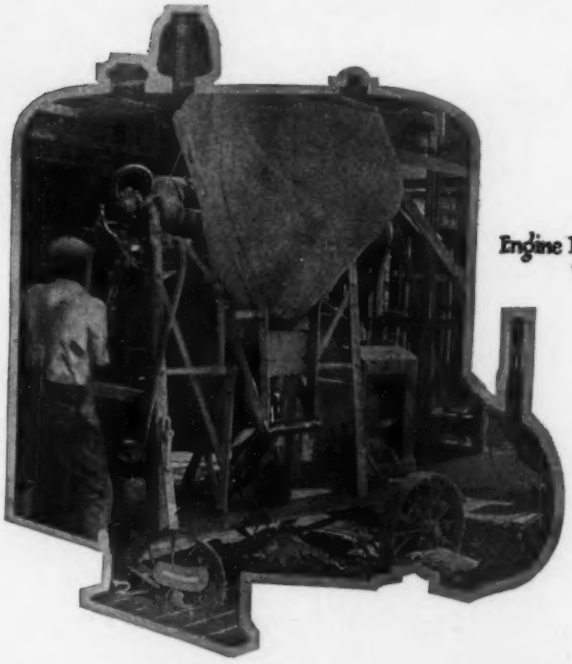
New York Boston Philadelphia Buffalo

GET THE BED ROCK FACTS ON YOUR CONCRETE

The Pittsburgh Testing Laboratory has made a specialty of concrete and cement testing for years, and the P. T. L. certificate is today nationally recognized by municipal engineers and officials.

Send for the P. T. L. Bulletin No. 26. Tells how you can determine absolutely the quality of concrete going into every job.

PITTSBURGH TESTING LABORATORY
PITTSBURGH -:- PENNA.
BRANCH OFFICES IN THE PRINCIPAL CITIES

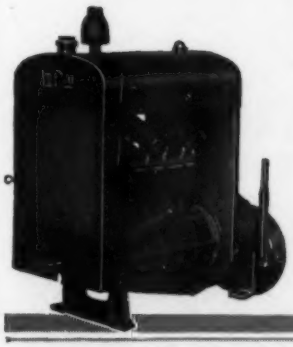


In the Shadow of Power!

IF power took form it would be gigantic. Its structure massive. For everywhere — on construction work, progress is measured by it. Buildings "grow" in its very shadow. But, of course, size is not indicative of service.

Le Roi Engines as well as being compact and sturdy are "power-full". Turning the drums of mixers or controlling cables of hoists—this dependable power gives "life" to equipment of manifold variety.

And to distinguish itself as a leader, it boasts of a record of unbelievable low maintenance cost. Le Roi's high and enviable position in its field is entirely due to unparalleled performance — in short, the lowest operating costs per day and per year.



See Le Roi's line of engines at the Good Road Show.

LE ROI COMPANY • MILWAUKEE

LE ROI ENGINES

for dependable power!

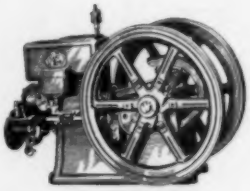
WILFORD

DETROIT USES WILFORDS

The City of Detroit finds Wilford the ideal power shovel for the in-between job. In this case the Wilford is widening Woodward Avenue, at Detroit's Civic Center, doing work that would otherwise be done by equipment costing several times as much.

The economies of this quarter-yard, one-man shovel, with dependable Fordson power and universal Fordson service, are surprising. Why not write today for complete specifications and descriptive literature?

Universal Power Shovel Co.
WILLIAM FORD, President
15841 Second Blvd. Detroit, Mich.



Built right— works right!

If you would know the reason for the consistent and fool-proof operation of Hercules engines, you will find it in the quality of Hercules' materials and in the precision of Hercules' manufacturing methods.

Note these features: Wico high-tension magneto—cam gear of cold rolled steel—interchangeable hard bearings—cylinder block and base separate—full height engine base—.45 carbon steel crankshaft and connecting rods, double heat-treated—automatic governor—separate governor and cam gear brackets—steel governor pinion—balanced rotating parts—interchangeable repair parts—hot spark—immediate starting—no mechanical skill required to operate—engine twice tested before final okeh.

Make no mistake about selecting an engine. Choose the Hercules—either as an individual power unit for miscellaneous work or as the motivating power built into nationally known concrete mixers, gravel screens, pumps, conveyors and other types of portable machinery for contractors.

The Servel Manufacturing Co.
Hercules Products Division
Evansville, Indiana

HERCULES ENGINES

buy with safety

A Complete Line of Hoists

Gasoline or Electric Driven

NH Light Duty Hoist

DH Heavy Duty Double Drum

Gasoline Skidder and Loader

Combination Hoist, Engine and Compressor Unit

DH Heavy Duty Double Drum with Boomswinger

DH Heavy Duty Double Drum

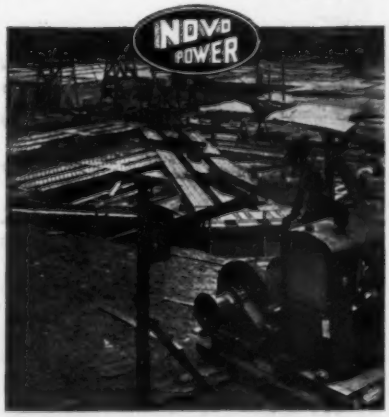
HOIST jobs up to 50 H. P. can be handled by a Novo. Why? Because Novo builds a *complete line* of hoists.

There are Novo Hoists for general construction and road work, mining, lumbering and fishing.

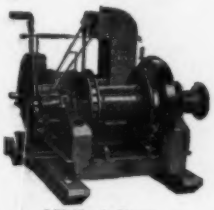
Novo Hoists are powered with Novo one, two and four cylinder industrial gasoline engines 1½ to 50 H. P., or electric motors.

Novo is a builder of industrial equipment, manufacturing both hoists and engines—guaranteeing undivided responsibility.

NOVO ENGINE CO.
Clarence E. Bement, Vice-Pres. & Gen. Mgr.
LANSING — MICHIGAN



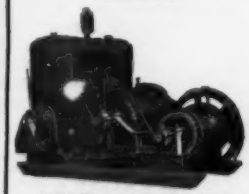
Deck Hoist



LH Single Drum

LH Double Drum

LH Double Drum, With Two Speed Reversing Sheave Attachment



DHG Heavy Duty Dragline

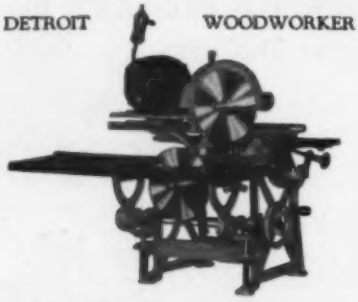
Heavy Duty Mining and Prospecting Hoist

DH Heavy Duty Single Drum

LH Single Drum

Light Duty Mining and Prospecting Hoist

DETROIT WOODWORKER



A Real Idea for *You!*

You are engaged in a young and rapidly expanding business—selling machinery to contractors. No one knows the extent to which this business will develop. You ought to be willing to try any sound idea that offers a possibility for the expansion of your business.

Here is an idea—a proven idea—well worth trying.

Take on the Detroit Woodworker. Push this machine energetically. You will find that it will not only produce a volume of sales and profits well worth while, but of even more importance, will put you in contact with hundreds of building contractors, shops and industrial institutions that will lead to a rapid expansion of your business, both as to number of customers and lines handled.

Contractors

You will find the Detroit is a complete wood working shop. 12 machines in one. Makes every cut necessary on house construction. Thousands are in use by building contractors, in shops, in lumber yards and industrial institutions throughout the country.

Write for catalog and complete agency proposition at once.

MASTER WOODWORKER MANUFACTURING CO.
610 Brush Street, Detroit, Mich.

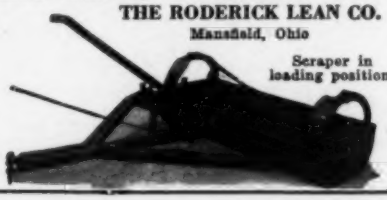
MASTER WOODWORKER MFG. CO.
610 Brush Street Detroit, Mich.

Please send me catalog
and your agency proposition.

*Name*_____

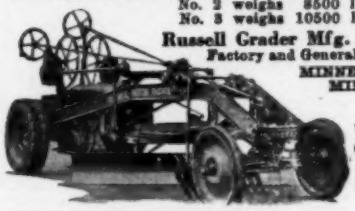
*Address*_____

The "GROUNDHOG"
Loads, and Spreads or Dumps, *Continuously!*
No Stopping — No Backing Required.
The most advanced type of tractor scraper on the market. *Write us for descriptive matter.*
THE RODERICK LEAN CO.
Mansfield, Ohio



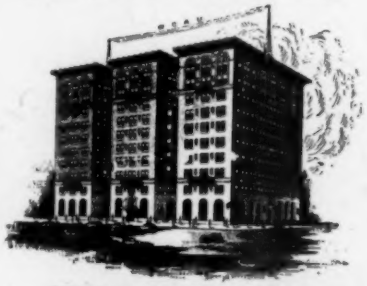
Scraper in loading position.

Russell Motor Patrol
Made in Two Sizes
No. 2 Fordson Tractor for Power ... **No. 3** McCormick-Deering 10-20 Tractor for Power
No. 2 weighs 8500 lbs.
No. 3 weighs 10500 lbs.
Russell Grader Mfg. Co.
Factory and General Offices
MINNEAPO MINN.

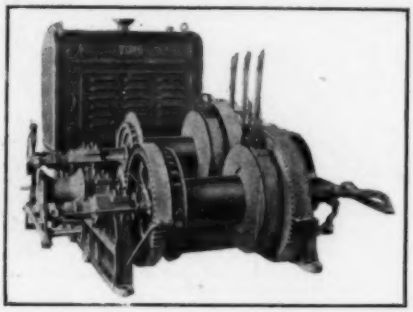


Write for Catalog Showing Full Line

PHILADELPHIA
Chestnut and 39th Street
Hotel Pennsylvania
Fireproof—Unrestricted Parking—Garage



OSCAR W. RICHARDS, Manager
600 ROOMS—500 BATHS
Rooms with running water from $2.50 per day
Rooms with private bath and shower from $3.50 per day
Food and Service the Best
Near West Philadelphia Station, Penn. Railroad
University of Pennsylvania—Franklin Field



FLORY

Double Drum Gasoline Hoists Equipped with Two Speeds on Front Drum. Speed Change Instantaneous without Stopping Motors and with Load on the Drum.

Capacity 5500 pounds at 175 Ft. Per Min.
50 H. P. 2400 pounds at 400 Ft. Per Min.

See It At The Chicago Road Show—Space G-14.
Send For Bulletin 2000

S. FLORY MFG. CO., Bangor, Pa.

Sales Agents In Principal Cities

Steam—Electric—Gasoline—Belt Driven Hoists
Cableways—Car Pullers—Dredging Machinery, Etc.

BUFFALO-SPRINGFIELD ROLLERS

All Types and Sizes
With or without Scarifier attachment.
Helps you finish the job on time.

Send for catalog A for complete information.

The Buffalo Springfield Roller Co.
Springfield. Ohio.

The Barton Portable Pump Reduces the Cost of Pumping

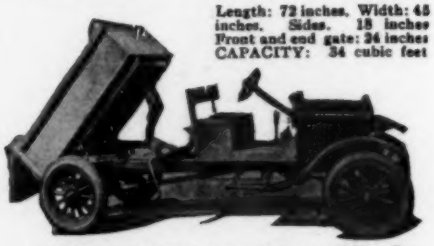
On any job where drainage must be accomplished by mechanical means the Barton Portable Pump does the work quickly and at little expense. An Automatic Primer prims the pump and keeps it primed. These features together with its capacity of 750 gallons per minute make this portable pump practical for general use.

Write for Bulletin.

AMERICAN STEAM PUMP CO.
Battle Creek, Mich.

Marion Dump Body

Length: 72 inches. Width: 48 inches. Sides. 18 inches Front and end gate: 36 inches CAPACITY: 34 cubic feet



Here it is—the real producer that never balks. It's durable and dependable.
Marion bodies can be used with hand hoist or as an automatic type.
This is a most satisfactory Dump Body for handling stone gravel, sand, dirt, coal and other loose material. Always ready for the hardest kind of service.
The Marion is the favorite of leading Highway Contractors. It is the dump body of exclusive features.

Showing Marion Body equipped with automatic sub-frame.

THE MARION STEEL BODY CO.
MARION, OHIO

HAND BUSH HAMMERS

A size for every bushing and dressing job on concrete.

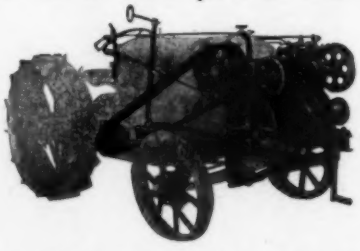
We would like to acquaint you with the most complete line of Pneumatic tools and chisel equipment for bushing concrete and finishing cast stone.

Hand Points and Chisels.
Hand and Striking Hammers.
Drill bits and Hollow Steels.

Descriptive matter awaits your call

THE DALLETT CO.
PHILADELPHIA
NEW YORK **CHICAGO**

The PIONEER Porta-Hoist

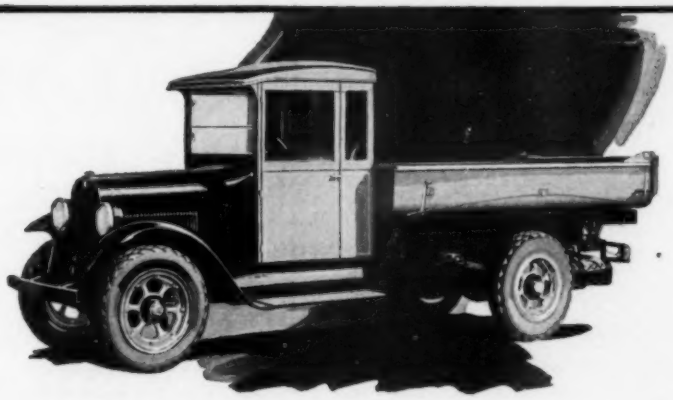


MOUNTED on the front of a Fordson Tractor. Single- or double-drum; reversing or non-reversing. Mean cable speed with standard drive 140 feet per minute. Capacity on single line is 3,500 pounds for continuous operation.

Write for more information.

PIONEER TRACTORS, Inc.
WINONA, MINN.

GRAHAM BROTHERS TRUCKS



Complete—Ready to Work

When your business requires a truck—or additional trucks—the need is immediate.

You can get the Graham Brothers Truck you want—without long delay. They are built in the right sizes and with the correct body styles to fit your needs.

And your dealings throughout the long life of the truck are with one concern—the Dodge Brothers dealer. He will be right there year after year to sell and to serve.

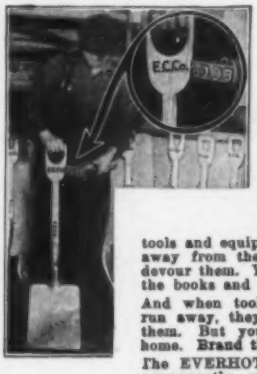
Only great mass production enables Graham Brothers to build for you such sturdy, dependable trucks at such low prices.

GRAHAM BROTHERS
Evansville—DETROIT—Stockton
A DIVISION OF DODGE BROTHERS, INC.
GRAHAM BROTHERS (CANADA) LIMITED—TORONTO, ONTARIO

Graham Brothers Trucks and Commercial Cars meet 91% of all hauling requirements.

¾-Ton Commercial Chassis - $ 670
1-Ton Chassis (G-BOY) - - 885
1½-Ton Chassis - - - - - 1245
2-Ton Chassis - - - - - - 1445*
*Disc Wheels With Dual Rear, Optional.
Prices f. o. b. Detroit

SOLD BY
DODGE BROTHERS
DEALERS EVERYWHERE



THESE TOOLS ARE NOT

ORPHANS

Tools and equipment, like children and dogs, wander away. Children and dogs come back, but tools and equipment don't. Once away from the fold, the wolves devour them. You write them off the books and buy more.

And when tools and equipment run away, they take Profit with them. But you can keep them home. Brand them.

The EVERHOT Branding Torch permanently marks your tools and your equipment.

No more orphans of the storm. Tools brander the EVERHOT Way are safe from the hands o. pilferers.

Brands or solders continuously. Burns gasoline.

Write for low prices and descriptive circular.

EVERHOT
America's Brand Makers
EVERHOT
MANUFACTURING CO. MAYWOOD, ILLINOIS

D-A Lubricant

"Clings to Metal"

A Densified

Pennsylvania Oil

FOR

Displacing old-fashioned and inefficient cup greases and gear compounds.

"D-A" Lubricant

is especially adapted for use on heavy duty machinery and is sold by distributors of this type of equipment everywhere.

D-A LUBRICANT CO., Inc.

Plant and Home Office:

INDIANAPOLIS - - INDIANA

THE MONEY-MAKER

Type P3—Wheel Mounted
Type Q3—Crawler Mounted

NELSON FORDSON LOADER

Capacity 100 cu. yds. an hour
Interchangeable Mountings

The Biggest Dollar's Worth

for Stock-piles, Batching or Grading

N. P. NELSON IRON WORKS, Inc.

Allwood, Passaic, N. J.

A MAGNIFICENT NEW HOTEL

400 Rooms with Baths

$3.00 *and up* for One Person

$4.50 *and up* for Two Persons

HOTEL
KNICKERBOCKER
NEW YORK

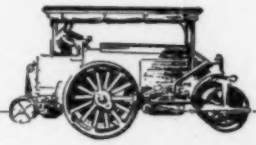
WEST 45TH STREET

Just East of Broadway

Times Square

Heart of

Theatrical and Shopping District



ACME ROAD MACHINERY

Every job, and every part of it, should show a profit.

By using Acme-built equipment—it will!

The experience of many contractors has shown:

That you can safely charge off less for depreciation on equipment of Acme quality;

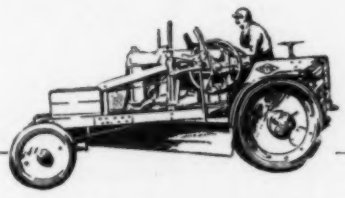
That the standardization of parts and notable accessibility keep repair costs down:

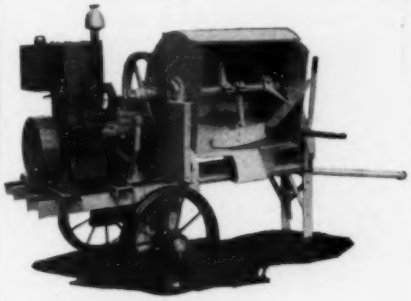
That Acme service helps tremendously to keep work-hours lost through breakdowns at a remarkably low point;

And that Acme simplicity and strength make for longer records of continuous service.

Write for Catalog, also for Bulletin No. 125, describing the Acme Tri-Utility Road Builder.

ACME ROAD MACHINERY CO.
FRANKFORT, N. Y.





Stands alone because:—

1. It is the only plaster mixer with the patented reverse spiral shovels which guarantee 100% thoroness in every mix.
2. It is clean-cut, built of the best materials money can buy, mechanically a thoroly well designed machine.
3. Saves time, labor and material.
4. Pays for itself very quickly from its actual savings.
5. Speeds up the job and increases earnings proportionately.
6. Is as efficient for concrete or mortar as for plaster.

May we send you full details?

The Mark of Quality

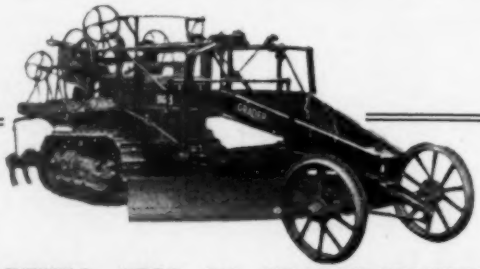
BLYSTONE MFG. COMPANY
127-C Street Cambridge Springs, Pa.
STEEL PLATEWORK

Every description of fabricated steel.

TANKS—RECEIVERS—CHUTES
TRAYS—ORE BINS—DREDGE PIPE
SMOKE STACKS—BREECHINGS.

Electric and acetylene welding and cutting.

BLYSTONE



SPEARWELL "BIG 8" GRADER-MAINTAINER

Equipped with Road Wheels for high-speed maintenance or Crawler Treads for heavy-duty grading—furnished for the following Tractors—

CATERPILLAR 2-TON, INTERNATIONAL "10-20," JOHN DEERE and FORDSON

A complete standard 8-ft. grader unit with 8-ft. blade, front or rear scarifier and with all standard controls, including blade reverse, operated from driver's platform in the rear.

Write for Illustrated Literature and Prices

SPEARS-WELLS MACHINERY CO., Inc.

Oakland, Calif.

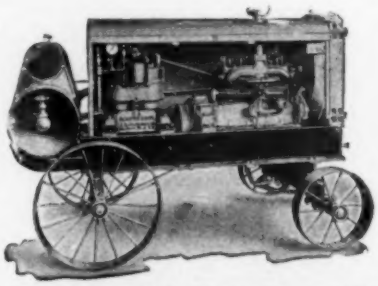
HAISS

If you own a sand pit or a material yard or are carting ashes or hiring a gang of shovelers—look into the possibilities of a Haiss Loader.

Catalog 523

The George Haiss Mfg. Co., Inc.

142nd Street and Park Avenue, New York



O. K. PORTABLE AIR COMPRESSORS

Give High Capacity at Reasonable Cost

Sizes: 118, 160, 265 cu. ft. piston displacement

Steel wheels, rubber tires, spring mounting

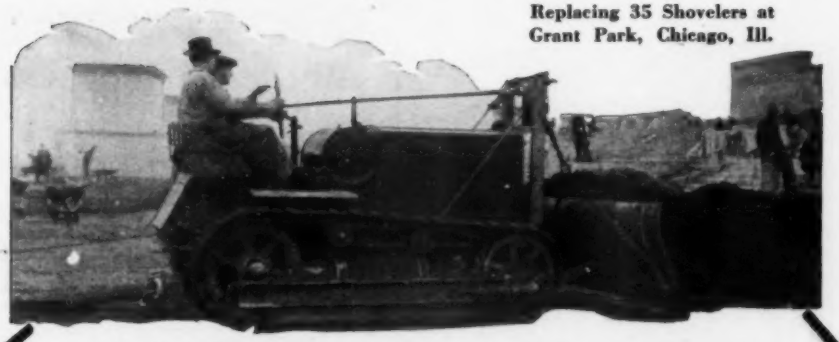
Also manufacturers of:

O. K. Gasoline Hoists 4 - 165 H.P.

O. K. Electric Hoists 5 - 150 H.P.

O.K. CLUTCH & MACHINERY CO.

COLUMBIA PENNA.



Replacing 35 Shovelers at Grant Park, Chicago, Ill.

BATES TRACTORS

3 SIZES

BATES 25
BATES 40
BATES 70

On bulldozing work Bates Tractors lead in the amount of work turned out in a day's time. Only the Bates embodies all three of the elements required for fast bulldozing—long crawlers, fast reverse speed and surplus power.

Write for new catalog

BATES MANUFACTURING COMPANY, Joliet, Illinois, U. S. A

Established 43 Years Ago

For moving heavy contractors' equipment use a—

Rogers Gooseneck

six-wheel trailer.

Also two-, four-, and eight-wheel types for all construction requirements.

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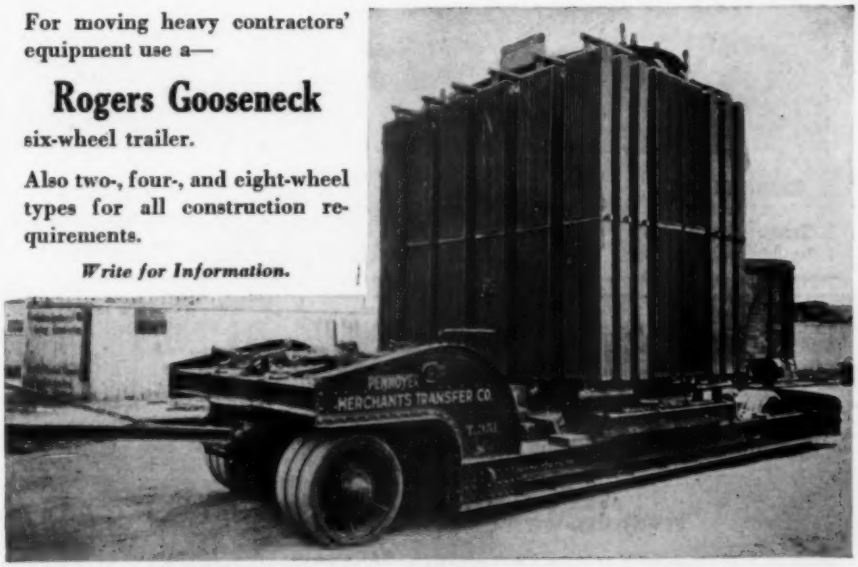


ROGERS BROTHERS CORPORATION, Albion, Penn.

STURDY, COMPACT
EASILY PORTABLE

BUILT FOR
REAL SERVICE

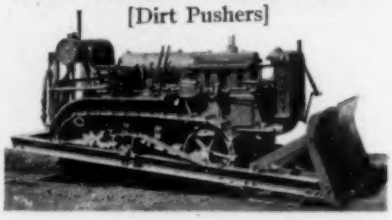
The single Humphryes High Capacity Diaphragm Pump powered with a LeRoi Engine is a popular unit.

The high capacity feature and non-clogging construction, combined with the ample power, make this pump the choice of many contractors.

Did you see Humphryes double four lift and force trench pump at the Road Show? If not, write for literature.

THE HUMPHRYES MFG. COMPANY
MANSFIELD OHIO

LaPLANT-CHOATE
All Steel Bulldozers
[Dirt Pushers]



For refilling ditches and trenches, and for moving or leveling loose materials—quickly, effectively, and economically! The LaPlant-Choate Bulldozer (Dirt Pusher) is designed right and constructed right. It will render a class of service which you would naturally expect from a product made by a large, well-established, experienced manufacturer. Made to fit all models of Caterpillar tractors. Write for full details.

We also manufacture a complete line of All-Steel Tractor Dump Wagons, Extension Reach Trailers, Heavy Transport Trailers, and Snow Plows for all makes and sizes of motor trucks and tractors.

DISTRIBUTORS IN PRINCIPAL CITIES

LaPLANT-CHOATE MFG. CO.
Cedar Rapids, —MANUFACTURERS— Iowa.
See our Exhibit in the Coliseum during Chicago Road Show—January 10-14, 1927

DUMP BODIES
for
Truck Chassis Up
to 3-ton Capacity.

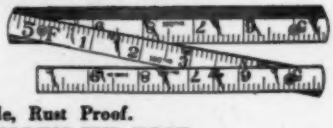
Count the Trade-Marks on the Road

ANTHONY COMPANY INC.
STREATOR, ILLINOIS

GRAVITY
ROLLER ROCKER
HAND HOIST

LUFKIN ALUMINUM RULES
IN 10ths and 100ths OF FEET.

FOR CIVIL ENGINEERS, SURVEYORS, HIGHWAY BUILDERS, TILE LAYERS, AND OTHERS



Accurate, Light Weight, Durable, Rust Proof.
FURNISHED WITH OR WITHOUT FOLDING END HOOK.

THE LUFKIN RULE CO. SAGINAW, MICHIGAN
NEW YORK WINDSOR, CAN.

SAVE "SHOE-LEATHER" ON YOUR HEAVY MACHINES

HIGHWAY TRAILERS

For Machines: Shovel, Crane, Roller, Trencher, Paver, Mixer, and Compressor.

For Materials: Cement, Sand, Gravel, Stone, Lumber, Steel, Pipe, etc.

Two, four, six and eight-wheel types—one-half to fifty ton capacities.

Write for Bulletins

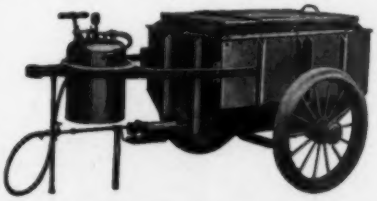
HIGHWAY TRAILER CO.
508 Fulton St.
Edgerton Wisconsin

HIGHWAY TRAILERS ARE BUILT IN THE WORLD'S LARGEST TRAILER PLANT

– for Road Contractors

CONNERY'S OIL BURNING KETTLE - *Style J*

This kettle is highly recommended for highway maintenance work and for the roofing contractor. *Low fuel cost and absolute temperature control* are assured by the construction of the inside tank, which keeps hot and cold materials separate. *Many other improvements described in circular.*



CONNERY & CO., INC.
4000 NORTH SECOND ST.
PHILADELPHIA, PA.

– for Roofing Contractors

Save TIME LABOR MONEY

on your next concrete surfacing job by using the

B-E R G

CONCRETE SURFACER AND FINISHER

The BERG removes fins, board or form marks and all surface irregularities quicker, better, and with less labor and expense than any other method. Recommended and used by leading architects, contractors, engineers on some of the country's biggest concrete jobs. Made in Electric and Air-Driven Models.

Complete information and prices mailed upon request.

THE CONCRETE SURFACING MACHINERY CO.
Dept. F
4669 Spring Grove Avenue
CINCINNATI OHIO

10 DAY *free trial*

This Automatic Scraper moves earth with speed and at lowest cost. Fills, Hauls, Dumps with Tractor in Conti—ou Forward Motion. NO STOPPINGnNO BACKING. Try it out on your ow job under our liberal TRIAL OFFER and convince yourself that you cannot afford to be without it.

Hundreds of Contractors are making a tremendous saving with Perry Scrapers. So can you. Write today for complete information.

PERRY SCRAPER CO.
Box 501
Sidney, Ohio

KIEL MASTER MIXER

Gives More For The Money

It's only natural that the Kiel Master mixer should do more work than any other mixer because it is better built.

SPECIAL FEATURES:
Dust-proof Counter Drive Shaft Bearings—Drum Spindle Bearing 10 Inches Long—Balanced Drum and Yoke—Large Capacity—Special Mixing Blades—Plenty of Power—Timken Roller Bearing Wheels—Positive Gear Drive.

Write for Catalog and Prices

KIEL MACHINE COMPANY
KIEL, WIS.

JT TRACTORS

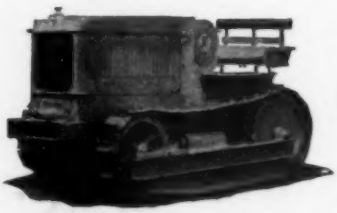
For

SATISFACTION

Ask any JT Operator

The JT Tractor Company
Cleveland, Ohio

40 H. P. Five Ton



Model 6630, Built Especially for Ford One-Ton Truck

Superior
Automatic Dump Body
GENERAL SPECIFICATIONS

Capacity (water level)	1¼ cu. yds.
Capacity gained by side boards	¼ cu. yds
Length	66 Inches
Width	48 Inches
Depth	16¾ Inches
Loading Height from ground	52 Inches
Weight (complete to mount)	758 lbs.
Ground clearance in dumping position, 19 in.	

Write Us for Prices
FACTORY & SERVICE STATION

SUPERIOR BODY CORPORATION, Marion, Indiana

Kinney
TRADE MARK
REG. U.S. PAT. OFF.

AUTO HEATER & DISTRIBUTOR

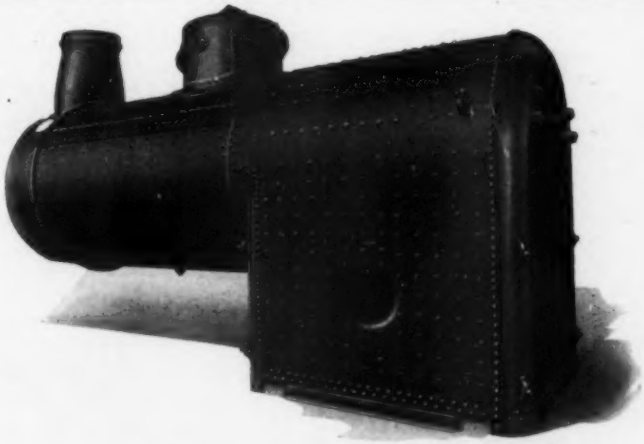
More Miles Have Been Covered by the KINNEY Distributor
than by any other heater and distributor in the world.

The KINNEY Heater and Distributor
will properly heat and apply the heaviest asphalts and tars as well as the lighter grades of bituminous road material with equal efficiency and with the least expenditure of time, labor and money.

Equipped with the Kinney Positive Pressure Pump and the Kinney Spraying Nozzles and circulating and heating systems. Self-loading from tank cars.

Write for Booklet

KINNEY MANUFACTURING COMPANY
BOSTON, MASS.



Have you a boiler problem?

JOHNSTON BROS., Inc.

Specializing in Boilers for Contractors' Equipment

FERRYSBUR G, MICHIGAN

When the job calls for large-quantity heating!

On road jobs where speed and quantity are the important factors entering into hot material operations, contractors will find Type No. 48 the most economical to use. At one loading batches can be heated sufficiently large for the usual run of road-construction job in one-third the time usually required. Used in batteries, these heaters will furnish a continuous supply. Rigidly constructed of the best materials, No. 48 will stand the punishment of continual use with very infrequent need of repair. Heavy-duty roller bearings with large reservoir for lubricant; two compartment covers, affording easy accessibility for loading, etc.; full-turning fifth wheel to permit turning in a very small space. Optional features are a specially designed barrel hoist, rubber-tired wheels and warming hood.

Write for full details and prices.

LITTLEFORD BROS.
485 EAST PEARL ST., CINCINNATI, O.

LITTLEFORD
TAR AND ASPHALT
HEATERS

"BEACH" ALL STEEL

Self Loading Scraper will OUTWEAR a dozen Board Scrapers

Try one and be convinced

Everything for Roads

BEACH MFG. CO. CHARLOTTE MICH.

DIXOYL
for CATERPILLARS

A Scientifically Denatfied Mineral Oil insuring 100 per cent lubrication in extremes of heat or pressure, in cold, in water or steam. Made in five densities.

For use wherever a heavy-bodied oil is required.

DIXOYL

DIXOYL INCORPORATED
Manufacturers
Vandeventer & Duncan Aves
St. Louis, Mo.

WANTED ---
ORGANIZER-SECRETARY

The Master Builder's Association of Atlantic City requires the services of a high class man to carry on its business affairs, to negotiate with the trades and to reorganize the association.

A two (2) year contract is guaranteed, to be extended longer if work is satisfactory. The salary is five thousand ($5,000) yearly, and will be increased if results are obtained.

All replies should be mailed direct to—

MASTER BUILDER'S BRANCH
Care of CHAMBER OF COMMERCE
Atlantic City New Jersey

SOLVAY FLAKE CALCIUM CHLORIDE CHANGED THAT SIGN!

It is no longer necessary to wait 28 days to open up concrete roads. Use Solvay Flake Calcium Chloride and cut the curing period to 7 days or less!

There is no longer any reason for curing concrete by the old fashioned earth and straw covering methods which are costly, slow, unsightly and do not give uniform results, due to the difficulty of maintaining proper inspection after construction has been completed.

The up-to-the-minute, modern method of curing concrete is by using Solvay Flake Calcium Chloride. When applying to the road surface it can be easily distributed by hand, requiring less than one-half the [illegible] or used in the other methods; mechanical application may also be used, which insures uniform distribution of the material. Its power of absorbing moisture from the air eliminates the necessity of daily sprinkling and inspection. If used integrally Solvay Flake Calcium Chloride is incorporated with the mixing water.

You take no chances curing with Solvay. Thorough laboratory and field investigations involving thousands of test specimens as well as actual experience in the use of this material for more than five years on over 3,000 miles of pavement, have positively proved the value of this new method of concrete curing. The new Solvay booklet gives authoritative specifications for surface application and for integral use.

Write for Booklet No. 2051.

SOLVAY SALES CORPORATION

Alkalies and Chemical Products
Manufactured by The Solvay Process Co.

40 Rector St. New York

SOLVAY CALCIUM CHLORIDE

Concrete Mixers, Hoists, Wheelbarrows, Warehouse Trucks, Steel Scrapers, Hand Carts, Rubber Tired Wheels, Skids, Electric Tractors, Fibre Wheels, Trailer Trucks.

Nearly half a century of manufacturing and distributing experience is back of Lansing Products. Buyers of Lansing equipment are assured of prompt shipment, efficient repair service and low freight rates.

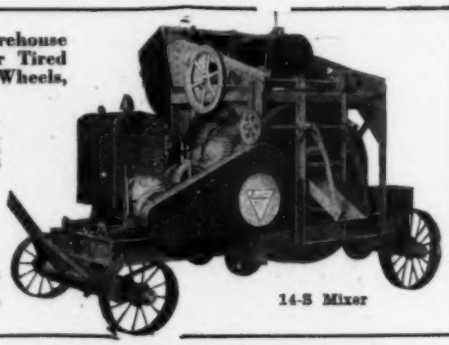
Send for Catalogs No. 12 and No. 19-C.

LANSING COMPANY

Lansing **Michigan**

BRANCHES

Chicago Boston New York Minneapolis
San Francisco Kansas City Philadelphia



14-S Mixer

DIXON'S
FLAKE GRAPHITE

THERE is but one flake graphite and its name is DIXON. For 100 years this name has been synonymous with the best graphite obtainable.

An ideal natural lubricant recommended for cylinders and bearings, coating gaskets, etc.

No. 1 Coarse Flake — No. 2 Powdered Flake

Write for Circular 148-C

1827 .... *One Hundredth Anniversary* 1927

JOSEPH DIXON CRUCIBLE CO.

Jersey City, N. J. Established 1827

WARRENITE-BITULITHIC PAVEMENT

—A WARRENted Product—

WARRENted to deliver perfect service
WARRENted rugged, honest materials
WARRENted under expert supervision
WARRENted for long, uninterrupted duty
WARRENted for low upkeep costs
WARRENted to be right for YOUR job.

WARREN BROTHERS COMPANY

International Highway Engineers and Contractors

Executive Offices: Boston, Mass.

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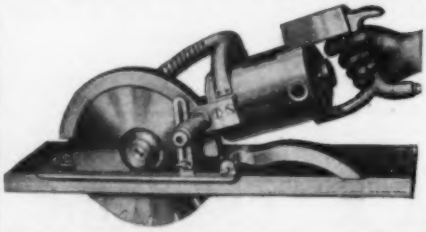
Harrisburg, Pa. — Dallas, Tex. — Birmingham, Ala.
Salt Lake City, Utah

4 inch Cutting Capacity



WODACK *electric* HAND SAW

(patents pending)

Attach to any light socket and save $20 a day sawing by power. Wodack is a hand tool weighing only 24 lbs., with 11-in. diameter saw. G. E. universal motor, A. C. and D. C. 60 cycles or less. 8-in. rip blade also furnished.

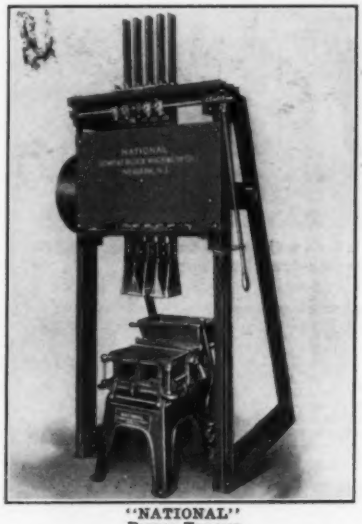
SAFETY GUARD

WRITE FOR CIRCULAR

Some territory open

F. L. ROGERS & CO.

440 So. Dearborn St. CHICAGO



"NATIONAL"
Power Tamper

WHAT "NATIONAL" MEANS IN CONCRETE BLOCK MACHINERY

The name "NATIONAL" on Concrete Block Machinery signifies all that is latest and best in block making efficiency and economy.

Write us for description

"NATIONAL"
Block Machines

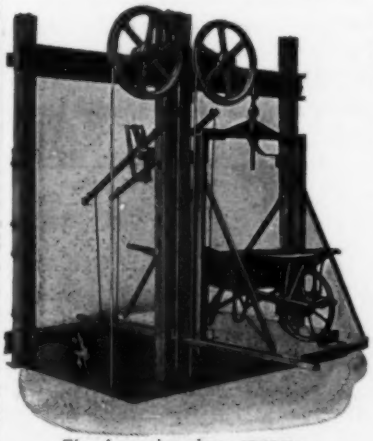
DEALERS IN ALL PRINCIPAL CITIES

CEMENT BLOCK MACHINERY CO.

50-58 COLUMBUS STREET **NEWARK, N. J.**

A ZETTERLUND AUTOMATIC HOIST LOWERS BUILDING COSTS

SAVES TIME — ENERGY — IS ECONOMICAL — EASY TO ERECT



The above view shows arrangement at discharge level.

Ask a "ZETTERLUND" user and be convinced. It is an "automatic" in every sense of the word. Be your own judge.

The Zetterlund Automatic Hoist saves the wages of an operator. The wheelers operate the Hoist from the discharge level, operating the control lever just as easily and simply as signaling an operator. The Hoist stops automatically at the floor level.

Easy to erect—saves time and energy—economical. Mounted on casters, it is easily and economically moved. The Zetterlund Automatic Hoist is efficiently propelled with a Le Roi engine.

It saves fuel through an automatic gas control.

Roller bearings reduce transmission losses to a minimum.

Manufactured by

Zetterlund Hoist & Machine Co.

128-132 Ferry Street **Milwaukee, Wis.**

Excellent Distributor Territory Open

BROOKVILLE GASOLINE LOCOMOTIVES

A Suitable Model for every contracting need, from 1 Ton weight up to 9 Tons. Suitable power for handling a single 1 Yd. batch car, up to a standard gondola.

"SUMMARY"

1	Ton special, Ford Model "T" power unit,	400 Lbs.	draw bar
1½	" Model "TA" Ford Truck " "	750 Lbs.	" "
2	" Model "TB" Ford Truck " "	1000 Lbs.	" "
3	" Model "TC" Ford Truck " "	1500 Lbs.	" "
4	" Model "FCR" Fordson Tractor "	2000 Lbs.	" "
5	" Model "FDR" Fordson Tractor "	2500 Lbs.	" "
6	" Model "IBY" McCormick-Deering "	2400 Lbs.	" "

Furnished all gauges—All high speed units—
Ford driven, two or four speeds, both forward and reverse.
Fordson and International, three speeds both forward and reverse—Without alteration of Tractor power units which are employed intact, other than discarding wheels and front axle assembly.

7	Ton Model "FHR" Fordson Tractor driven	2800 Lbs.	draw bar
8	" Model "FIR" Fordson Tractor "	3200 Lbs.	" "
9	" Model "IBX" McCormick-Deering "	3600 Lbs.	" "

Furnished standard or narrow gauge—Slow speed—
Three speeds forward—Three speeds reverse.
MCB or link and pin couplings.

A general catalog cheerfully furnished upon request

BROOKVILLE LOCOMOTIVE COMPANY Brookville, Penna. —— U. S. A. ——

HE CHANGED HIS ADDRESS TWICE IN ONE YEAR

A contractor on our subscription list recently sent in his second change of address during the year, with a letter of apology for the extra work he was making for our Subscription Department. We want everyone of our readers to know that no apologies are called for, even if you send us a change of address every month. We want you to have the CONTRACTORS' AND ENGINEERS' MONTHLY at your new address just as quickly as you change from the former location, and the coupon below is included for your convenience in notifying us.

Contractors' & Engineers' Monthly,
443 Fourth Avenue, New York City.

Kindly change my address on your subscription list from

Name .....

Address .....

—TO—

Name .....

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City and State .....

Cut Back Asphalt

THE two photographs above show surface treatment with Cut Back Asphalt on the north section of the Midway, from Ellis Avenue to Woodlawn Avenue, Chicago. The Midway is one of the most heavily traveled boulevards in Chicago, and serves as a route for all traffic from the East in to the city. The surface treatment of this boulevard was accomplished in the following manner.

The original pavement was of asphaltic concrete. An application of Cut Back Asphalt in a cold state, was made to the surface, and was followed by an application of granite chips ranging in size from one-half to one-quarter inch. The roadway was then dragged so as to mix the Cut Back Asphalt and the granite, and also to bring the material to a true surface. After this, another cold application of Cut Back Asphalt was made, followed by a very light application of granite chips.

This Cut Back Asphalt is composed of heavy asphalt and volatile oil. This combination rejuvenates the surface of the old pavement and also temporarily softens the surface, which permits the granite chips to be firmly imbedded in the old pavement.

The photo on the left shows the roadway immediately after the first trip of the distributor for the second application of Cut Back Asphalt. The photograph on the right shows the boulevard after it had been opened to traffic.

Surface treatment is an effective and economical method of restoring all types of pavement to first class condition.

STANDARD OIL COMPANY

(Indiana)

General Offices: **910 S. Michigan Ave. Chicago, Illinois**

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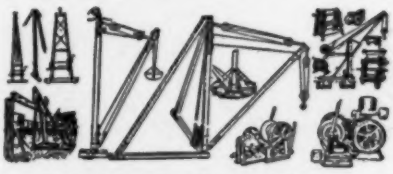
Decatur	Indianapolis	Des Moines	MICHIGAN	Minot	Mankato	St. Joseph
Joliet	South Bend	Mason City	Detroit	WISCONSIN	Minneapolis	St. Louis
Peoria	KANSAS	Sioux City	Grand Rapids	La Crosse		
Quincy	Wichita		Saginaw	Milwaukee		

HAUCK
TRADE MARK

Oil Burning
Asphalt Tool Heaters
Asphalt Surface Heaters
Heaters for Asphalt, Pitch and Tar Kettles, Lead Melting Furnaces, Blow Torches.
Send for Special Bulletins
HAUCK MANUFACTURING CO.
Established 1900
149 Tenth St. **Brooklyn, N. Y.**



WE HAVE A COMPLETE LINE
OF DERRICKS AND WINCHES
SASGEN DERRICK CO.
103 W. Grand Ave. **Chicago, Illinois**

UNION WATER METER CO.
Worcester, Mass.

Union Water Meter Company is one of the few American manufacturing concerns that has progressed sixty years under the same ownership. This pioneer company began in the early sixties and incorporated in 1868 the organization which has won a place of leadership in the manufacture of water meters, valves, stops, pipe lining equipment and fire whistles. Catalog G-57 sent on request.

New York Office: 50 Church St.
Philadelphia Office: 539 Real Estate Trust Bldg.

ALDRICH
THE ALDRICH PUMP COMPANY
Foot of Pine St.
Allentown, Pa.
HYDRAULIC TABLES—DATA 50
SEND FOR IT.
VERTICAL, HORIZONTAL **POWER** TRIPLEX QUINTUPLEX
PUMPS

R P

Royal Palace
on the Beachfront
ATLANTIC CITY

Send for Illustrated Booklet and Schedule of Rates

No "Seasons" at Atlantic City!

NO MATTER what time o' year you come to Atlantic City you are "in season." So, too, with the Royal Palace Hotel. Situated on the Boardwalk and radiating an air of restful hospitality. All rooms have running water—most rooms have private bath—all baths both sea and fresh water. Hotel operates under American Plan and presents a distinguished cuisine. On the premises: Private Sea Water Swimming Pool, Tennis Courts, Dancing, Children's Play Room, Therapeutic Baths, Barber, Beauty Parlor, Roller Chairs—truly—*a Resort in Itself!*

STITZER HOTEL CO.
OWNERSHIP MANAGEMENT

CURE CONCRETE *while you mix it!*

Many road builders who previously used Dowflake as a surface curing agent are now using it added directly to the mix in the form of a solution.

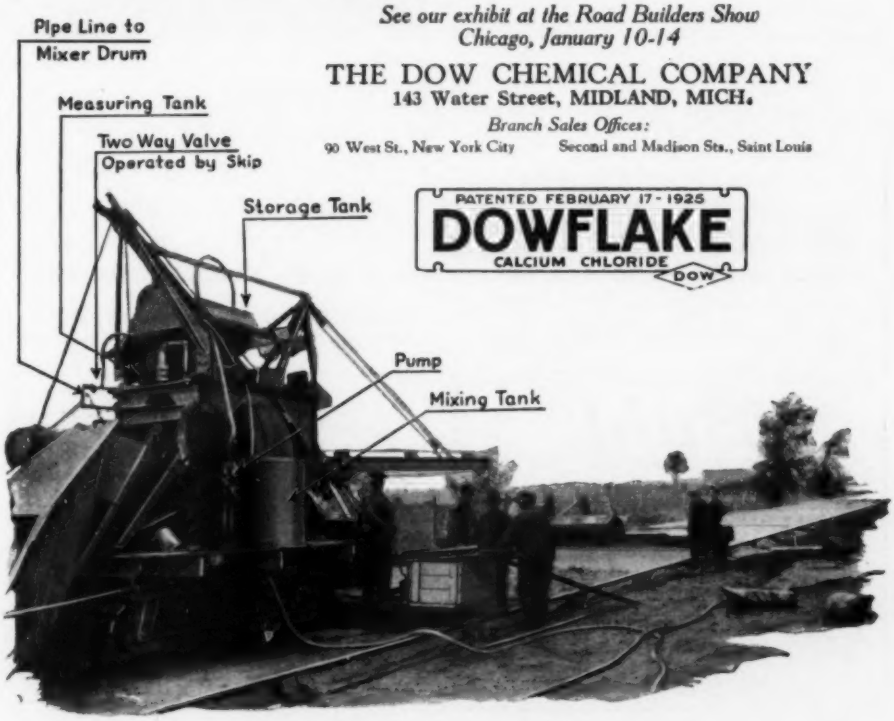
Any standard mixer can be easily equipped to permit admixture curing. The illustration shows an excellent arrangement. The Dowflake is mixed in an open-top mixing tank. From the mixing tank the solution is pumped into a storage tank. This feeds a measuring tank, which is automatically opened by the skip when it comes up. This releases the proper amount of solution which runs into the mixer drum with the cement and aggregates.

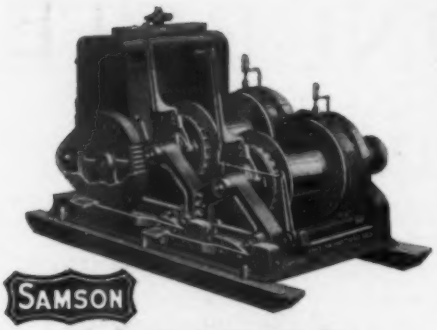
This admixture method results not only in greater economy and ease of handling, but also insures more uniform curing because the curing agent penetrates throughout the mix.

See our exhibit at the Road Builders Show
Chicago, January 10-14

THE DOW CHEMICAL COMPANY
143 Water Street, MIDLAND, MICH.

Branch Sales Offices:
90 West St., New York City Second and Madison Sts., Saint Louis





HOISTS

Electric or Gasoline Engine Power for loads ranging from 500 to 8,000 pounds.

Write for bulletins 80-E and 80-S.

ENGLISH BROS. MACHINERY CO.
Iron Works Dept.
Manufacturers Established 1880
KANSAS CITY, Missouri, U. S. A.

THE EUCLID SCRAPER

is not an ordinary scraper. If you are interested in moving more earth at less cost, don't fail to write today for literature on this speedy, efficient and economical scraper.

The Euclid Crane & Hoist Co.
108 Chardon Rd. Euclid, Ohio
Offices in all principal cities

Aeroil

"Smokeless" — "Oil Burning"

Concrete Heaters
Thawing Torches
Portable Water-heaters
Asphalt Melting Kettles
Salamanders
Mortar Heating Pans
Sand and Gravel Heaters
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No Smoke—No Sparks—No Ashes—Just Heat

Send for Illustrated Catalogues and Testimonials

AEROIL BURNER COMPANY, Inc.
UNION CITY NEW JERSEY

UNIVERSAL HOISTING MACHINERY CORP.
420 Sycamore St., BUFFALO, N. Y.

DERRICKS, STEEL OR WOOD; WIRE ROPE SHEAVES AND BLOCKS; WINCHES, HAND AND ELECTRIC

Let us show you our real design of Derrick Fittings Backed by an Unusual Guarantee

Buhl

A variety of types and sizes to meet every portable compressor demand—Sold through reliable dealers and distributors.

BUHL type "Y" furnished in 115 and 160 ft. displacement

Send for bulletins today

The Buhl Company
MANUFACTURERS
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405 S DEARBORN ST.
CHICAGO

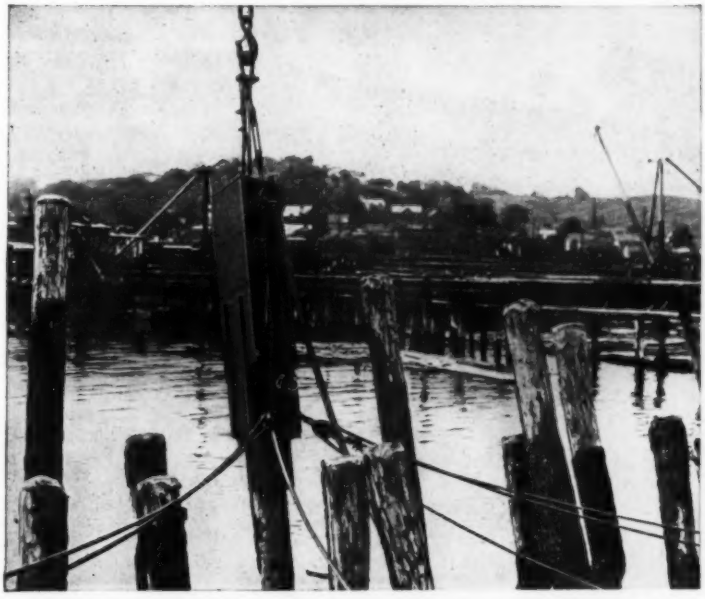
MILLER AUTOMATIC SIPHONS

Clean Sewers

Miller Siphons prevent sewers clogging from accumulated refuse. They regularly flush out the filth. No moving parts. Our complete descriptive text books give all details.

Literature on Request.

PACIFIC FLUSH-TANK CO.
Singer Bldg. 4241 Ravenswood Ave.
NEW YORK CITY CHICAGO, ILL.



The picture above is one of the sixty interesting snapshots of McKiernan-Terry Pile Hammers being used on various kinds of pile driving work—from the heaviest concrete monoliths to the lightest wood and steel sheeting—shown and described in our Bulletin 35.

One of the Sixty Pictures

McKiernan-Terry Hammers are just as efficient on batter piling as on vertical, due to the double-acting principle. On the job illustrated, the McKiernan-Terry Hammer drove two piles to every one driven with drop hammers in batter leads. During one 8-hour day, 92 long batter piles were driven—one every 5 minutes.

McKiernan-Terry Double-Acting Hammers save labor, speed up the job, and add substantially to the profit in pile-driving.

Send for Bulletin 35. If you wish to see our local sales representative, please so state.

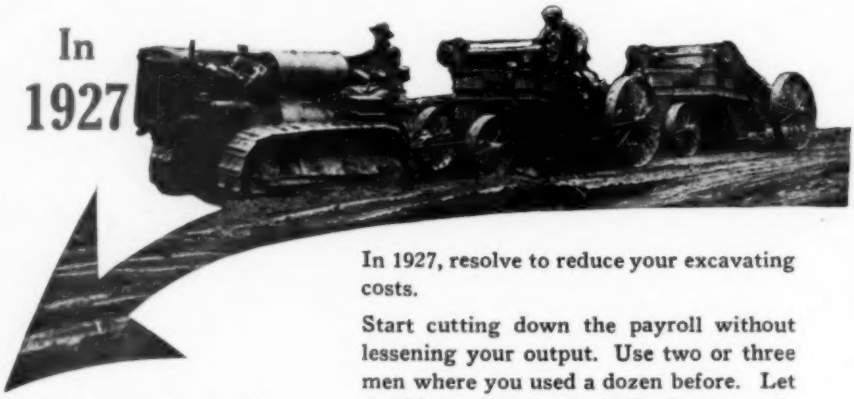
McKiernan-Terry Drill Co., 19 Park Row, New York

McKiernan-Terry

DOUBLE-ACTING RAPID-DRIVING

PILE HAMMERS

In 1927



Faster Grading Bigger Yardages Fewer Men

Model D, 1¼-yd.; Model H, ¾-yd.

In 1927, resolve to reduce your excavating costs.

Start cutting down the payroll without lessening your output. Use two or three men where you used a dozen before. Let machine-power do the bulk of your work. Make every man count.

That is what owners of Baker-Maney Self-Loading Scrapers have been doing for years. They have handled big jobs and moved large yardages with only two or three men on the job. They use the simplified method of earth-moving—the "Baker-Maney Way."

Yes, two men, tractor-operator included, is a full "gang" for a three-scraper outfit. Three men handle the longest train of Baker-Maneys you can use. Can you think of a simpler organization for moving 500 to 600 yards of dirt per day?

Catalog No. 209A is of interest to road officials and contractors. It tells all about automatic dirt-moving. Send for your copy.

SEE OUR EXHIBIT at the ROAD SHOW, Chicago, Jan. 10-14, 1927, Space N. C. 4

The Baker Manufacturing Co.
585 Stanford Ave. Springfield, Ill.

BAKER MANEY
Self Loading Scrapers

The

"No Trespassing" Sign
Which Protects Your Roads

SEALTIGHT

THE PERFECTED JOINT

Sealtight is the "No Trespassing" sign which prevents one slab from encroaching upon another—forestalling crushing, spalling and buckling.

Sealtight is a premoulded joint, made from a high-grade pure blown asphalt and a long flexible vegetable fibre filler, which upon oozing seals the joint perfectly. It is easy to install in any weather—will not crack in winter or distort in summer. **Sealtight** is reinforced throughout —not merely on the sides.

"Make the Road Right—Use "Sealtight"

W. R. MEADOWS, Inc.

ELGIN, ILLINOIS

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you

The Outdoor Overhead Crane

THE quarry's cleared—the warning whistle sounds—in the power house—the powder man—at the signal—he throws in the switches—the blasts are set off. The quarry face slides down—more stone in the making. The men are back at work—drilling rocks too big to move—shovels loading skips.

Up over-head—the Cableway—knowing what's expected of it—comes with on empty skip—places it—and off to get a loaded one. Take it away—and up it goes out of the way—a thousand feet to the crusher—makes it in less than a minute—dumps the load in the crusher—handled by gravity after that—back again.

The Cableway in the quarry is an economic factor to be considered by the progressive operator. Low in initial cost—and lower still in operating expense—it will save its cost many times over. Think what a traveling crane will save you in your quarry—then let us show you the similarity of the Cableway and the Crane.

Write

for Bulletin 56 describing STREET Cableways in detail, and telling about our Cableways Engineering Department.

—Today

STREET CABLEWAYS

STREET BROS. MACHINE WORKS, Inc.

Chattanooga, Tennessee

Makers of Hoists, Derricks, Cableways, Slacklines, Etc.

When writing to advertisers, please mention the Contractors' & Engineers' Monthly—Thank you.

DISTRIBUTORS OF CONSTRUCTION EQUIPMENT

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of the various lines handled. Buyers will find this list a convenient means of getting in touch with dealers who make a point of giving satisfactory service and prompt shipments. The location of these distributing points may be found on the map shown on the two following pages.

ALABAMA

C. B. DAVIS ENGINEERING CO.

Brown Marx Bldg. Birmingham, Ala.

CRANES
CONVEYORS
BELTS
SCREENS
PUMPS
BUCKETS
GEARS
SILENT CHAINS

Representing

Robins Conveying Belt Company
Morgan Engineering Co.
Nordberg Mfg. Co.
Wheeler Mfg. Co.
Aldrich Pump Company
G. H. Williams Company
William Ganschow Company

HERBERT GAD

1001 Martin Bldg., Birmingham, Ala.

Representing

KOEHRING CO.—Concrete, Mixers, Pavers, Cranes and Shovels
BAY CITY DREDGE WKS.—Dredges and Shovels
C. H. & E. MFG. CO.—Hoists, Pumps, Saw Rigs
ERIE STEEL CONSTR. CO.—Aggremeter Plants, Clam Shell Buckets

The Going Road Machinery Co., Inc.

1624 1st Ave. Birmingham, Ala.

Contractors' Equipment

Representing

Jaeger Machine Co.—Mixers, Hoist and Placing Plants.
Speeder Mach. Corp.—Gas and Pull Shovels, Cranes and Draglines.
Advance-Rumely Co.—Tractors and Motors.
Domestic Engines & Pump Co.—Pumps.

ALABAMA

Smith-Meadow Supply Company Inc.

1629 Avenue "A" Birmingham, Ala.

Representing

CLYDE IRON WORKS—Hoists and Derricks
RANSOME CONCRETE MACHY. CO.—Mixers and Pavers
McMYLER-INTERSTATE CO.—Shovels and Cranes
JOHN DEERE PLOW COMPANY—Plows and Wheelbarrows
BALDWIN TOOL WORKS—Alloy Steel Shovels
BUFFALO STEAM PUMP CO.—Pumps
BEACH MFG. CO.—Portable Saws

"Service That Merits Your Business"

JOHN D. TURNER

921-927 Pioneer Bldg.
Birmingham, Alabama

MATERIAL HANDLING EQUIPMENT

REPRESENTING

Barber-Greene Co.—Portable Conveyors, Self Feeding Bucket Loaders, The Ditcher With The Vertical Boom.
Easton Car and Construction Co.—Industrial Cars and Track-Turntables, Roll Over Dump Bodies.
Lakewood Engineering Co.—Concrete Construction and Road Building Equipment.
Nordberg Manufacturing Co.—Trackshifters, Shoveloaders.
Northwest Engineering Co.—Crawler Cranes, Draglines, Shovels.
Shaw-Enochs Co.—SHAWNEE Road Builder and Maintainer.
Universal Crane Co.—Truckcranes.
Geo. D. Whitcomb Co.—Electric and Gasoline Locomotives.

The Young & Vann Supply Co

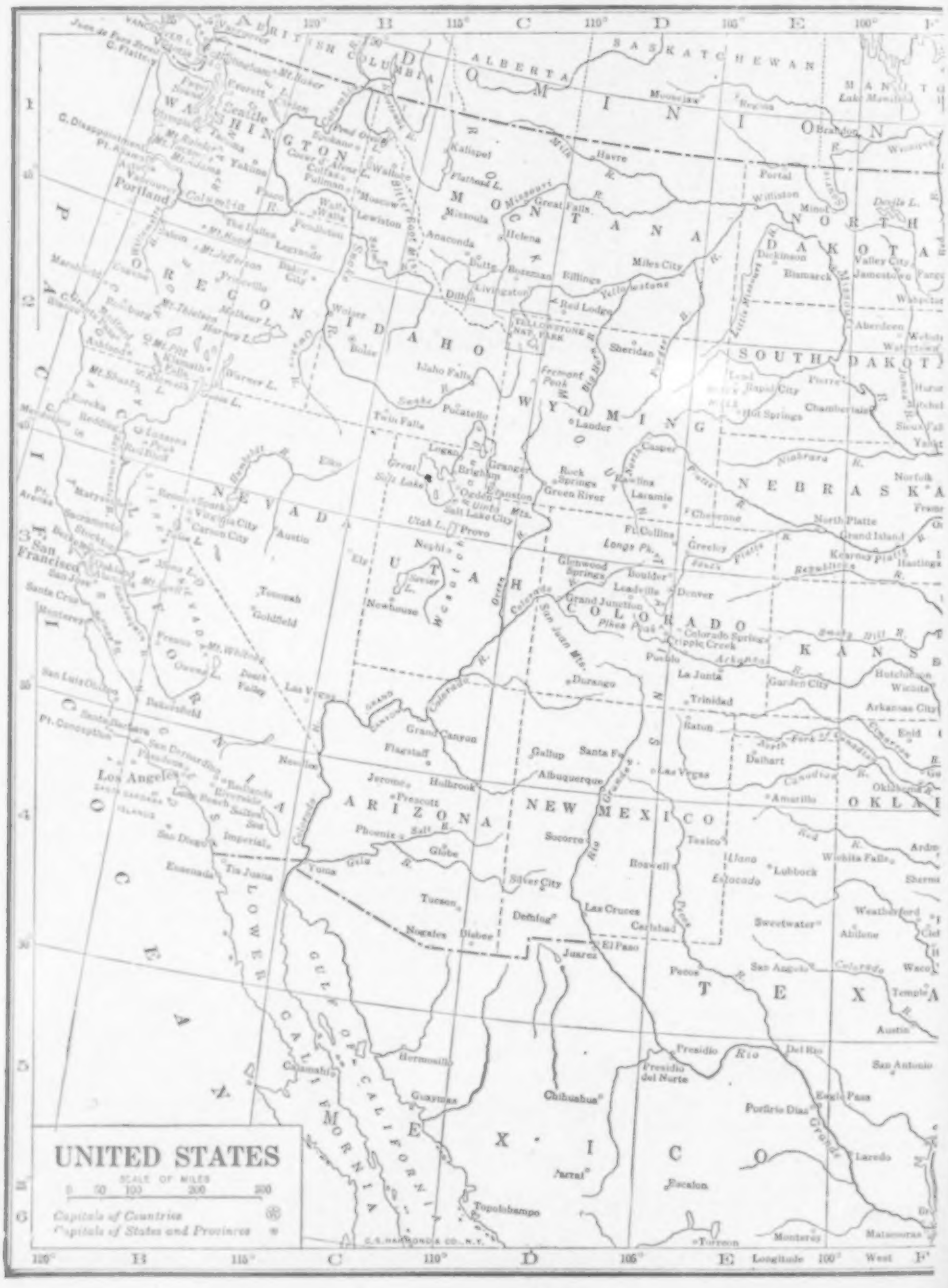
Birmingham, Ala.

Complete line of Contractors' Equipment and Supplies.

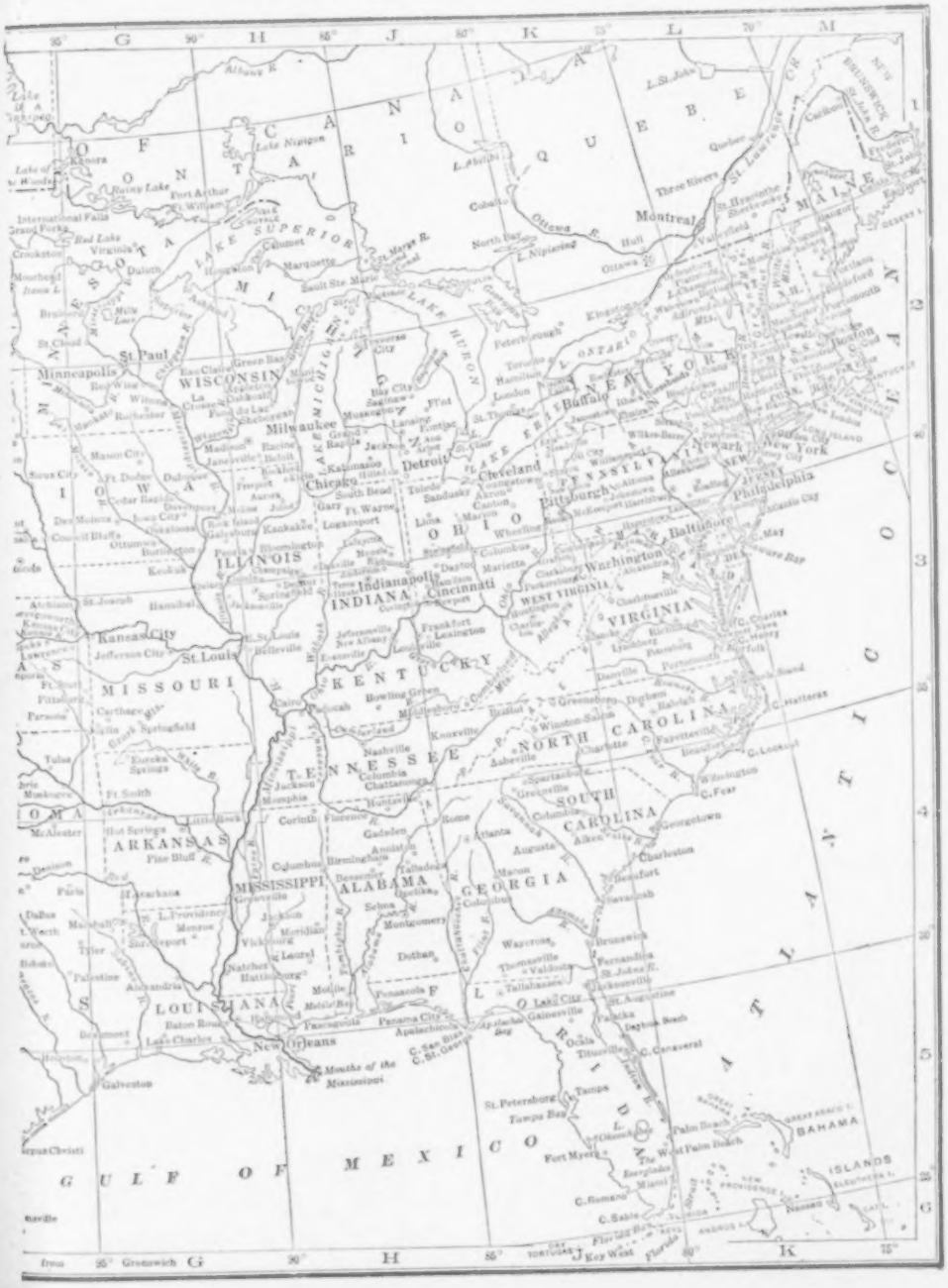
REPRESENTING

Smith Concrete Mixers and Pavers
Novo Hoists, Pumps, etc.
Blaw-Knox Steel Forms, Batcher Plants, Clam Shell Buckets
Worthington Pumps and Air Compressors
Thew Gas, Steam and Electric Shovels
Baker Backfillers and Unloaders
Archer Concrete Towers
Rex-Watson Dump Wagons
Red Edge Shovels and Picks
Akron Wheelbarrows
Carey Elastite Expansion Joint
M. & M. Form Clamps

The georgraphical location of any distributor whose address appears in this directory may be found by consulting this map.



Readers who notice the omission of names of any well-known dealers from the directory on the following pages are invited to notify the publishers.



ALA.—ARIZ.—ARK.

LAWRENCE-GOODLING CO., Inc.

161-165 N. Water St. Mobile, Ala.

Representing

Galion Iron Wks. & Mfg. Co.—Road Machines, Road Rollers, etc.
A. B. Farquhar Co., Ltd.—Saw Mills, Boilers and Engines.
Sidney Steel Scraper Co.—Wheelers, Drag Scrapers, Road Plows, etc.
Gordon Hollow Blast Grate Co.—Edgers and Trimmers.
Henry Disston & Sons—Saws
Oliver Ames Corporation—Shovels
Ransome—Concrete Mixers

If you are located in Western Florida, Southern Mississippi or Alabama let us serve you.

TURNER SUPPLY COMPANY

N. W. Corner St. Louis & Commerce Sts., MOBILE REPRESENTING **ALABAMA**

American Steel & Wire Co.
Monitor Wire Rope
Link Belt Co.
Conveyor Transmission Equip.
Simonds Saw and Steel Co.
Yale & Towne Mfg. Co.
Hand and Electric Hoist
Worthington Pump & Machy.
Pumping Machinery
Fairbanks Morse & Co.
Sheffield Hand & Push Cars
Fairmont Motor Corp.
Railroad Motor Cars
U. S. Chain & Forging Co.
Conveyor and Coil Chain
Union Steam Pump Co.
Burnham Pumps
Lansing Co.
Barrows, Trucks, etc.
American Sawmill Machy. Co.
Sawmill Equipment
Orr-Sembower Co.
Engines, Boilers and Concrete Mixers
Western Wheel Scraper Co.
Contractors, Road Equipment
American Rolling Mill Co.
Genuine Armco Ingot Iron
Wyoming Shovel Co.
Red Edge Shovel & Scoops

Arizona Tractor & Equipment Co.

238 W. Jefferson St., Phoenix, Arizona

Distributors for:

J. D. Adams & Co.
Buffalo-Springfield Roller Co.
Caterpillar Tractor Co.
Harnischfeger Corp.
Blaw-Knox Co.
The Heil Co.—Hoists
Insley Mfg. Co.
Killefer Mfg. Co.
La Plant-Choate Mfg. Co.
Littleford Brothers
Page Engineering Co.
T. L. Smith Co.

JOE LYONS MACHINERY CO.

Contractors' Equipment and Supplies

112 Louisiana St. Little Rock, Ark.

Representing:

REX—Mixers and Pavers
CLYDE — SASGEN—Derricks and Hoists
BLAW-KNOX—Curb, Gutter and Road Forms, Bins, Batchers, Clamshell Buckets, Truck Turntables
RED STAR—Wheelbarrows and Concrete Carts
RED EDGE—Shovels and Picks
C. H. & E.—Pumps, Saw Rigs and Hoists.
NORTHWEST—Shovels, Cranes and Draglines
AMERICAN—Wire Rope.
CLIMAX — LEROI — FULLER & JOHNSON—Engines
OIL PULL—Road Tractors
BATES—Bar Ties.
Also anything else a contractor uses

CALIFORNIA

The BROWN-BEVIS CO., Inc.

470 East Third St., Los Angeles, Cal.

DISTRIBUTORS

T. L. Smith Co.—Concrete Mixers, Pavers and Excavators
J. D. Adams and Co.—Adams Leaning Wheel Graders.
Byers Machine Co.—Hoists, Cranes and Truckcranes
Wood Shovel & Tool Co.—Wood Molybdenum Shovels
Lakewood Engineering Co.—Concrete Placing Machinery and Road Finishers
Geo. Hales Mfg. Co.—Truckloaders and Conveyors
Barnes Mfg. Co.—Barnes Pumps
The Owen Bucket Co.—Clam Shell Buckets
The Buckeye Traction Ditcher Co.—Curb and Trench Ditchers
Rex-Watson Corp.—Dump Wagons
Universal Crusher Co.—Crushers.
Traylor Engineering & Mfg. Co.—Rock Crushing Equipment
Osgood Co.—Power Shovels
Four Wheel Drive Auto Co.
Littleford Bros.—Tar and Asphalt Heaters, etc.

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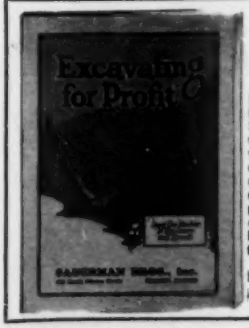

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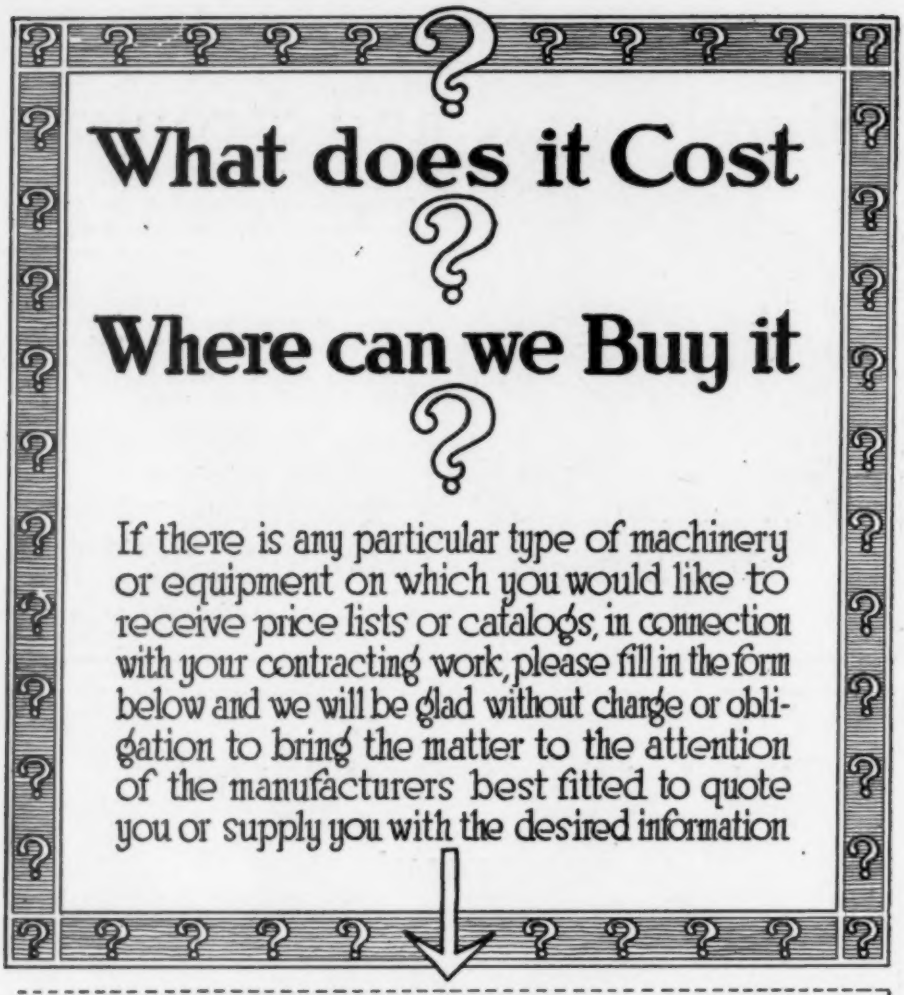
On pages 153 to 174 of this issue will be found a record of the principal dealers in contractors' equipment and a list of the manufacturers whom they represent.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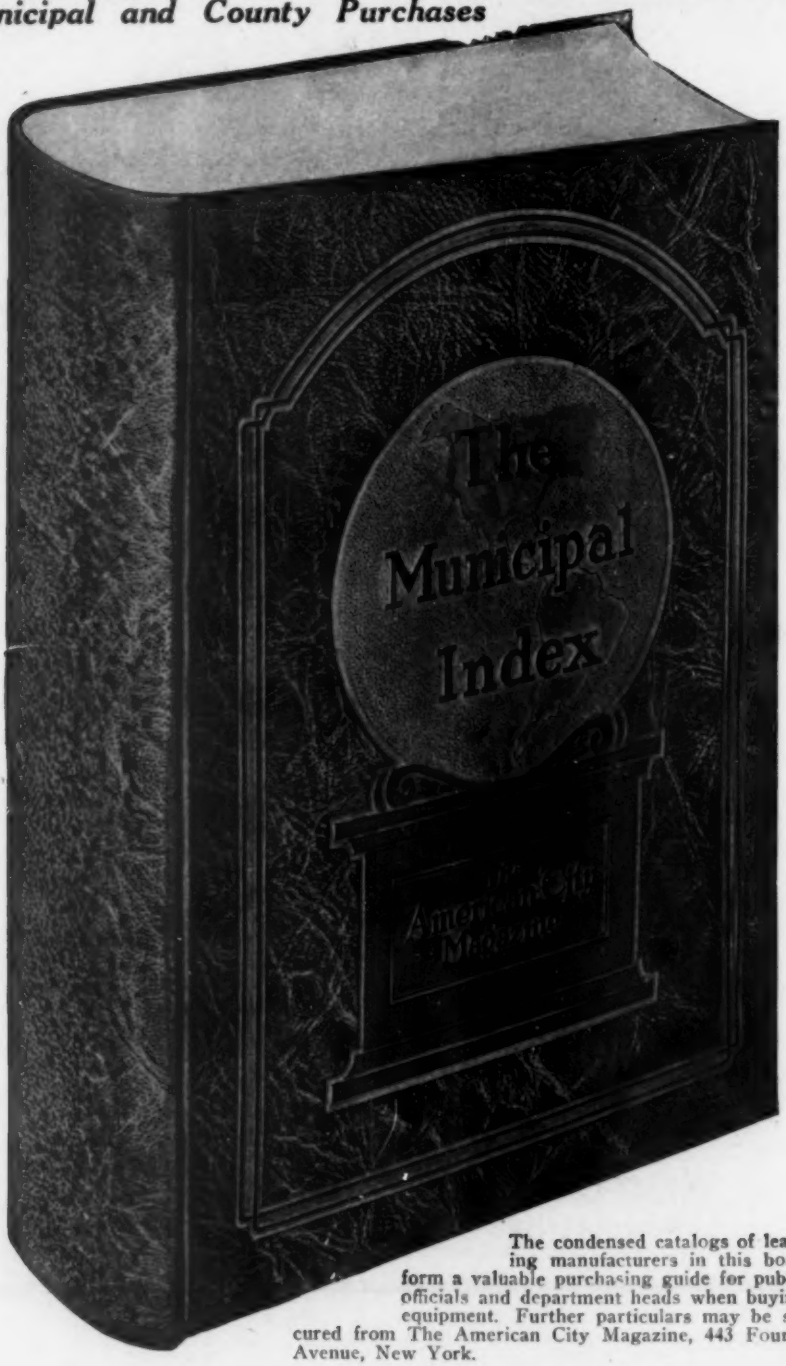

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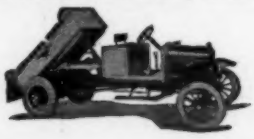

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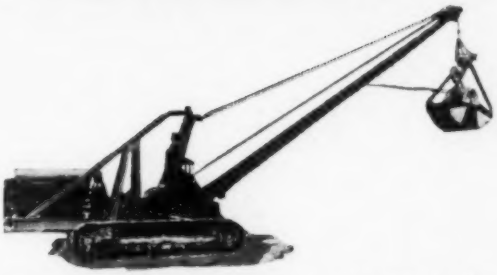

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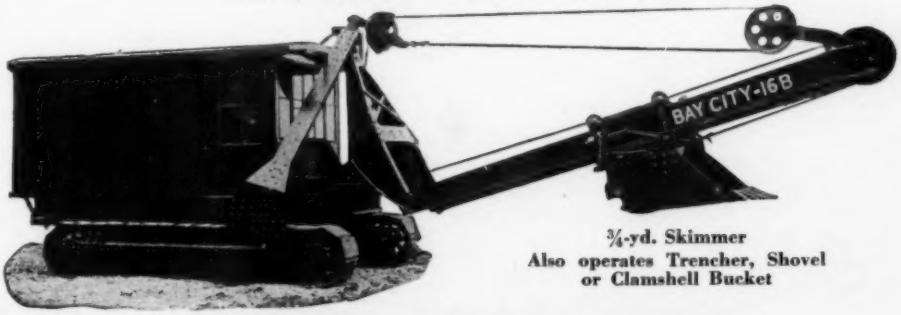


¾-yd. Skimmer
Also operates Trencher, Shovel or Clamshell Bucket

BAY CITY DREDGE WORKS

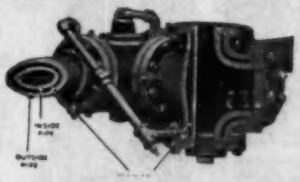
New York Office: 302 Broadway DREDGES POWER SHOVELS CRANES BAY CITY, MICH.

Engineers recommend the Iroquois System because

1. Steam jackets cover all moving parts. Pump can be started and stopped at will without cleaning out.
2. Easy to operate. Only unskilled labor is necessary. Requires practically no attention.
3. Simple in construction. All wearing parts easily accessible. No springs or small, easily-broken parts in valve chambers.
4. Large straight passages speed up pumping and prevent clogging.
5. Low in maintenance cost. Original pump of this design, after pumping many thousand tons of asphalt, shows no signs of wear and has required no repairs.

Complete data and specifications will be gladly sent on request, together with information regarding the complete Iroquois Line of road-building machinery.

With all these advantages it is easy to understand why the Iroquois Steam-Jacketed Pump and Fittings have proved without an equal for pumping asphalt and other viscous materials that will not flow at atmospheric temperatures. A system designed to give the utmost satisfaction in asphalt, oil and coal-tar refineries, and plants manufacturing prepared roofing, gas, chemicals, starch, glucose, molasses, fatty acids, etc.



Cross-sectional view of Iroquois Steam-Jacketed pipe and valve, showing method of construction.

Iroquois Sales Department

New York Chicago Pittsburgh

THE BARBER ASPHALT COMPANY

Philadelphia

St. Louis Kansas City San Francisco

IROQUOIS Steam Jacketed Pump and Fittings